Service Manual

SM-MDS_(i)

Multi Digital Scroll System

McQuay Air Conditioning

Engineered for flexibility and performance ™

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Preface

This manual provides a guideline for service personnel to perform start-up/commissioning on the MDS system. Besides providing the details on the system wiring method, termination connection and PCB setting, this manual also consists of information and working instruction on the Smart Commander Service Version. This service manual contains all the information needed (such as complete list of error code with troubleshooting flow chart for possible root cause) to do necessary repair, maintenance and troubleshooting task for the MDS air conditioner system.

This service manual is intended for and should only be used by qualified engineers/service personnel. Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment.

Caution: Sharp edges and coil surfaces are a potential injury hazard. Avoid contact with them.

Warning: Moving machinery and electrical power hazard. May cause severe personnel injury or death. Disconnect and lock off power before servicing equipment.

1.0 Introduction

1.1 Digital Scroll Compressor

MDS system is utilizing the digital scroll compressor technology to modulate its supply capacity to meet most indoors requirement closely. MDS system offers in both R22 and R410A refrigerant, the product line up, together with number of compressors in one outdoor unit is as follow:

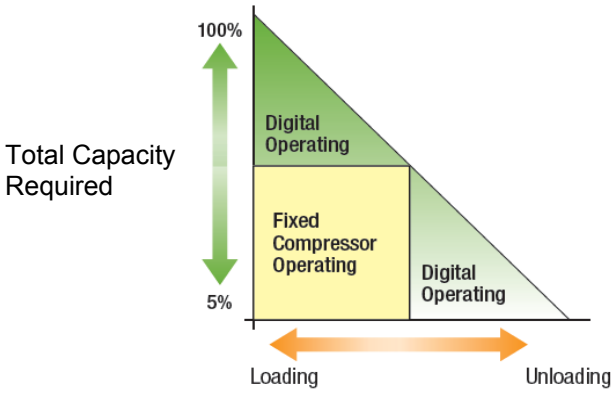
Model	Compressor Quantity		Refrigerant	Remark
	Digital Scroll	Fix Scroll		
MDS 030A(R)	1	-	R22	
MDS 040A(R)	1	-	R22	
MDS 050A(R)	1	-	R22	
MDS 060A(R)	1	-	R22	
MDS 070A(R)	1	-	R22	
MDS 080B(R)	1	1	R22	
MDS 100B(R)	1	1	R22	
MDS 120B(R)	1	1	R22	
MDS 150B(R)	1	2	R22	
MDS 180B(R)	1	2	R22	
MDS 200B(R)	1	3	R22	
MDS 220B(R)	1	3	R22	
MDS 240B(R)	1	3	R22	
MDS 260B(R)	1	4	R22	MDS 120B(R)**M** + MDS 150B(R)**S**
MDS 280B(R)	1	5	R22	MDS 150B(R)**M** + MDS 130B(R)**S**
MDS 300B(R)	1	5	R22	MDS 150B(R)**M** + MDS 150B(R)**S**
MDS 320B(R)	1	5	R22	MDS 160B(R)**M** + MDS 160B(R)**S**
5MDS 050B(R)	1	-	R410A	
5MDS 060B(R)	1	-	R410A	
5MDS 070B(R)	1	-	R410A	
5MDS 080B(R)	1	1	R410A	
5MDS 100B(R)	1	1	R410A	
5MDS 120B(R)	1	1	R410A	
5MDS 140B(R)	1	2	R410A	
5MDS 160B(R)	1	2	R410A	
5MDS 180B(R)	1	2	R410A	
5MDS 200B(R)	1	3	R410A	
5MDS 220B(R)	1	3	R410A	
5MDS 240B(R)	1	3	R410A	
5MDS 260B(R)	1	4	R410A	5MDS 120B(R)**M** + 5MDS 140B(R)**S**
5MDS 280B(R)	1	4	R410A	5MDS 120B(R)**M** + 5MDS 160B(R)**S**
5MDS 300B(R)	1	4	R410A	5MDS 120B(R)**M** + 5MDS 180B(R)**S**
5MDS 320B(R)	1	5	R410A	5MDS 180B(R)**M** + 5MDS 140B(R)**S**
5MDS 340B(R)	1	5	R410A	5MDS 180B(R)**M** + 5MDS 160B(R)**S**
5MDS 360B(R)	1	5	R410A	5MDS 180B(R)**M** + 5MDS 180B(R)**S**
5MDS 380B(R)	1	6	R410A	5MDS 240B(R)**M** + 5MDS 140B(R)**S**
5MDS 400B(R)	1	6	R410A	5MDS 240B(R)**M** + 5MDS 160B(R)**S**
5MDS 420B(R)	1	6	R410A	5MDS 240B(R)**M** + 5MDS 180B(R)**S**
5MDS 440B(R)	1	7	R410A	5MDS 240B(R)**M** + 5MDS 200B(R)**S**
5MDS 460B(R)	1	7	R410A	5MDS 240B(R)**M** + 5MDS 220B(R)**S**
5MDS 480B(R)	1	7	R410A	5MDS 240B(R)**M** + 5MDS 240B(R)**S**
5MDS 500B(R)	1	7	R410A	5MDS 250B(R)**M** + 5MDS 250B(R)**S**

Remark: **M** refers to Master unit and **S** refers to Slave unit. This combination cannot be changed.

Digital Scroll Compressor

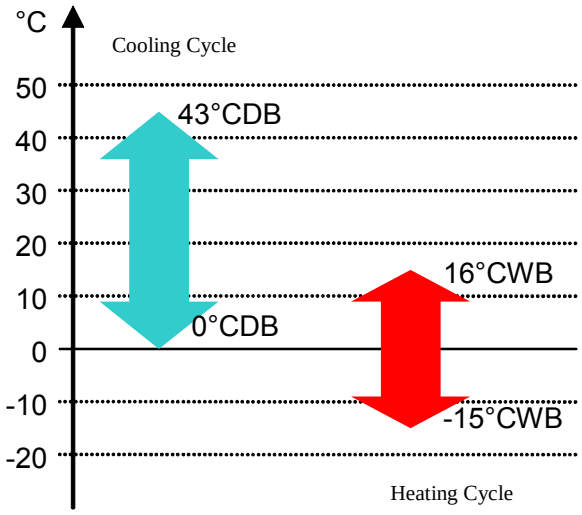
Fix Scroll Compressor

Digital Scroll Compressor can be easily identified by the presence of PWM valve. On the other hand, Fix Scroll Compressors do not have any PWM valve for modulation purpose. The combination of Digital and Fix Scroll Compressor work according to the following principle:



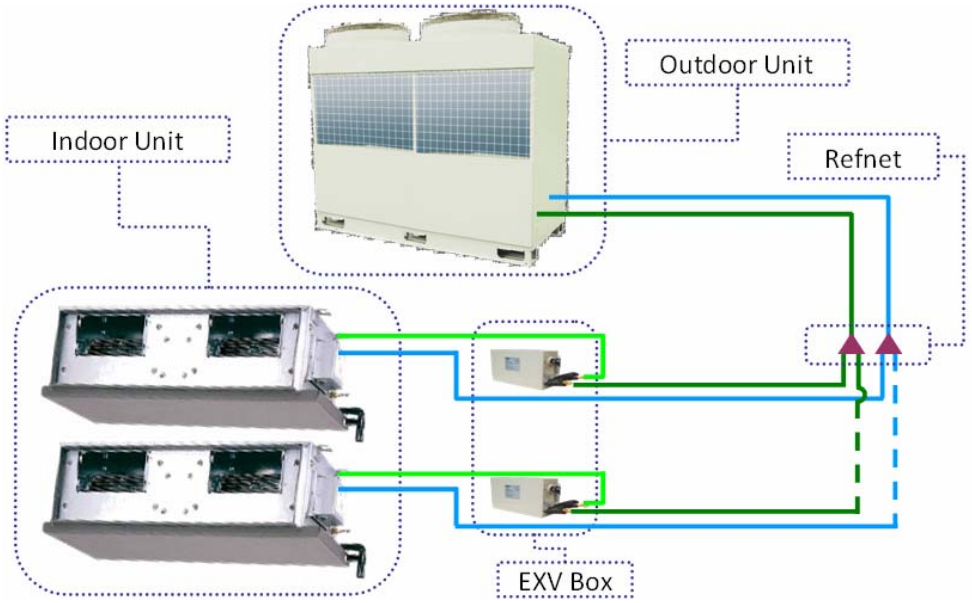
1. Digital Scroll Compressor is the leading compressor which will turn ON first.
2. With assistance of PWM valve, Digital Scroll Compressor will modulate the refrigerant flow according to the total indoor capacity required.
3. When the total indoor capacity exceeds the maximum capacity of Digital Scroll Compressor, Fix Scroll Compressor will turn ON.
4. When Fix Scroll Compressor is ON, Digital Scroll Compressor will continue to modulate the refrigerant flow accordingly.

1.2 Operating Range



MDS unit is tested under standard condition (27°C DB/19°C WB Indoor and 35°C DB/24°C WB Outdoor for cooling, 20°C DB/15°C WB Indoor and 7°C DB/6°C WB Outdoor for Heating) and should operate within the range stated in diagram above.

1.3 Basic Layout of MDS System



Generally, MDS system consists of outdoor unit, indoor unit, refnet or distributor and EXV box.

1.4 Maximum Connectable Indoor

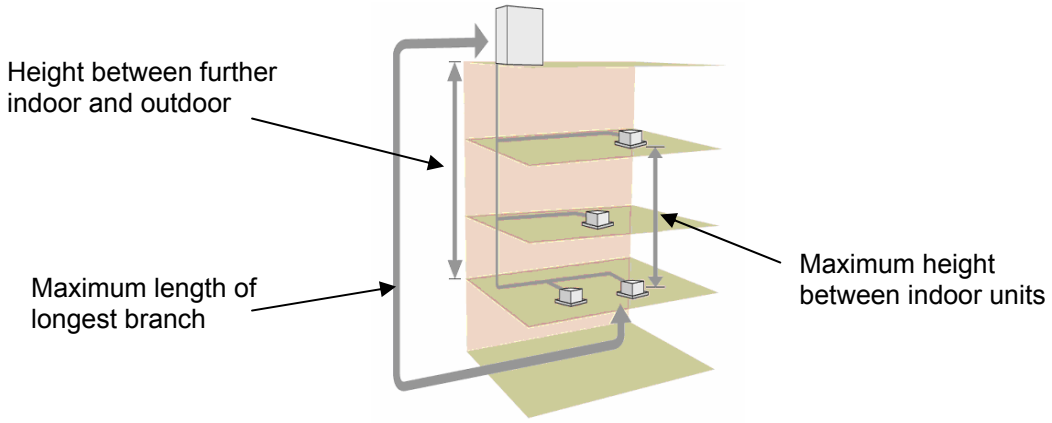
MDS system is very flexible and versatile as one outdoor unit can be connected to multiple indoor units. The table below shows the maximum connectable indoor units for each outdoor:

R22 Model	R410A Model	Maximum Indoor Quantity
MDS 030A(R)	-	5
MDS 040A(R)	-	6
MDS 050A(R)	5MDS 050B(R)	8
MDS 060A(R)	5MDS 060B(R)	9
MDS 070A(R)	5MDS 070B(R)	11
MDS 080B(R)	5MDS 080B(R)	13
MDS 100B(R)	5MDS 100B(R)	16
MDS 120B(R)	5MDS 120B(R)	16
-	5MDS 140B(R)	20
MDS 150B(R)	-	20
-	5MDS 160B(R)	20
MDS 180B(R)	5MDS 180B(R)	24
MDS 200B(R)	5MDS 200B(R)	24
MDS 220B(R)	5MDS 220B(R)	24
MDS 240B(R)	5MDS 240B(R)	24
MDS 260B(R)	5MDS 260B(R)	32
MDS 280B(R)	5MDS 280B(R)	32
MDS 300B(R)	5MDS 300B(R)	32
MDS 320B(R)	5MDS 320B(R)	32
-	5MDS 340B(R)	36
-	5MDS 360B(R)	36
-	5MDS 380B(R)	36
-	5MDS 400B(R)	38
-	5MDS 420B(R)	38
-	5MDS 440B(R)	38
-	5MDS 460B(R)	38
-	5MDS 480B(R)	38
-	5MDS 500B(R)	38

1.5 Maximum Piping Length

The presence of sub-cooling circuit within MDS system has allowed the system to qualify for long piping application. Besides that, MDS system is designed to ease oil return to the compressor and this has further improved the maximum connectable piping length for each system.

			R-22			R-410A		
Length (m)			3-5HP	6-7 HP	8-32 HP	5HP	6-7 HP	8-50 HP
Piping	Total equivalent length		100	150	350	100	150	500
	Maximum length of longest branch	Actual piping length	50	70	125	50	70	150
		Equivalent length	60	80	150	60	80	175
	Maximum equivalent length from first branch to furthest unit		25	30	40	25	30	65
Height	Between further indoor and outdoor	outdoor above	20	30	50	20	30	50
		indoor above	20	30	40	20	30	40
	Maximum height between indoor unit		15					

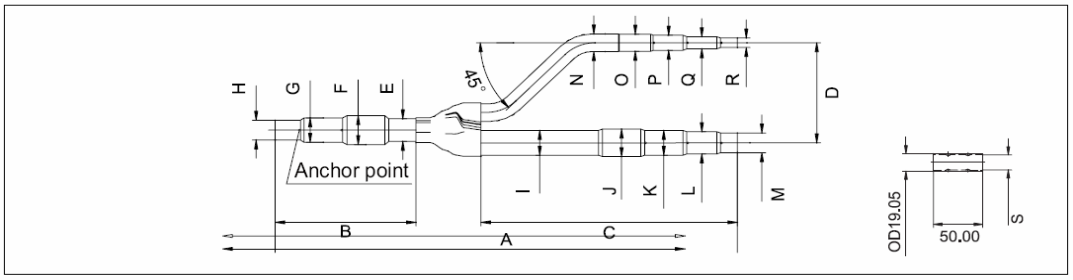


1.6 Refnet and Distributor

The refnet joint and distributor is provided by the factory in accordance with different indoor units. This will reduce the work force at site and ease the piping installation work. The dimension of refnet and distributor available is as follow:

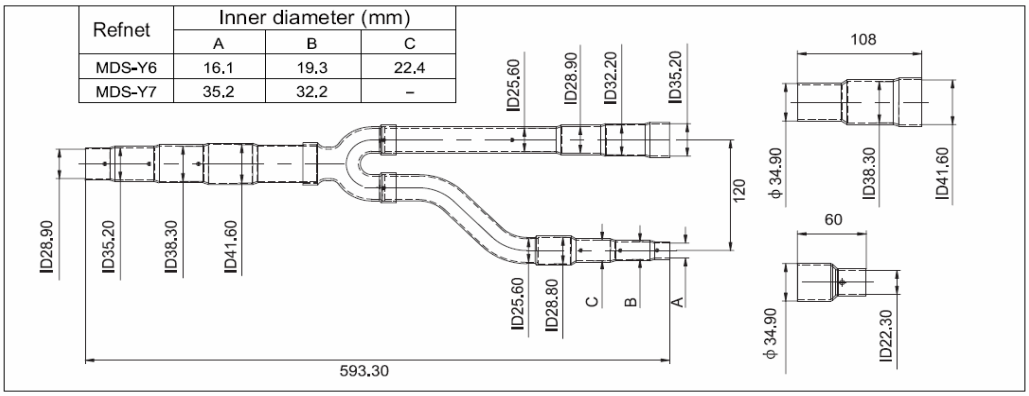
Refnet Joint : MDS-Y1-A, MDS-Y2-A, MDS-Y3-A, MDS-Y4-A, MDS-Y5-A, MDS-Y6-A, MDS-Y7-A
Distributor : MDS-C1, MDS-C2, MDS-C3

Pipe connector model	Length (mm)				Diameter (mm)				Diameter (mm)						Diameter (mm)				
	A	B	C	D	E(Outer diameter)	F	G	H	I	J	K	L	M	S	N(Outer diameter)	O	P	Q	R
MDS-Y1	553	1 72	293	120	28.6	28.9	25.7	22.5	28.6	28.9	25.7	22.5	19.3	16.1	22.2	19.3	16.1	12.9	9.7
MDS-Y2	420	142	223	80	15.88	16.1	12.9	9.7	12.7	12.9	9.7	6.5	/	/	12.7	12.9	9.7	6.5	/
MDS-Y3	420	142	223	80	15.88	16.1	12.9	9.7	1.7	12.9	9.7	6.5	/	/	15.88	16.1	12.9	9.7	/
MDS-Y4	493	142	223	80	22.2	22.5	19.3	16.1	19.1	19.3	16.1	12.9	9.7	/	19.1	19.3	16.1	12.9	/

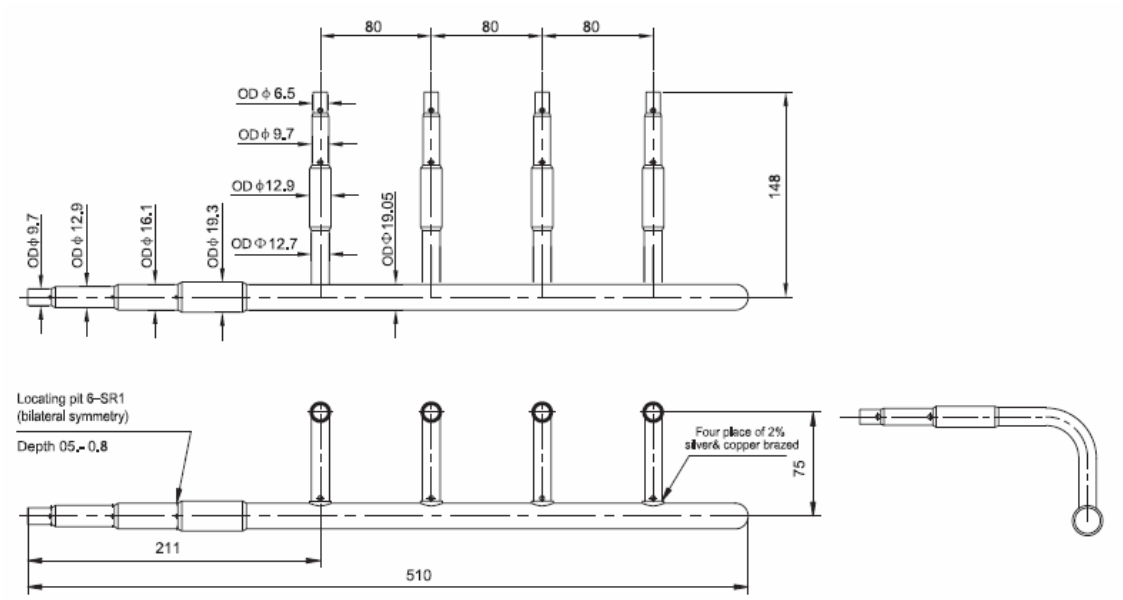


Dimension of refnet model MDS-Y1-A, MDS-Y2-A, MDS-Y3-A and MDS-Y4-A

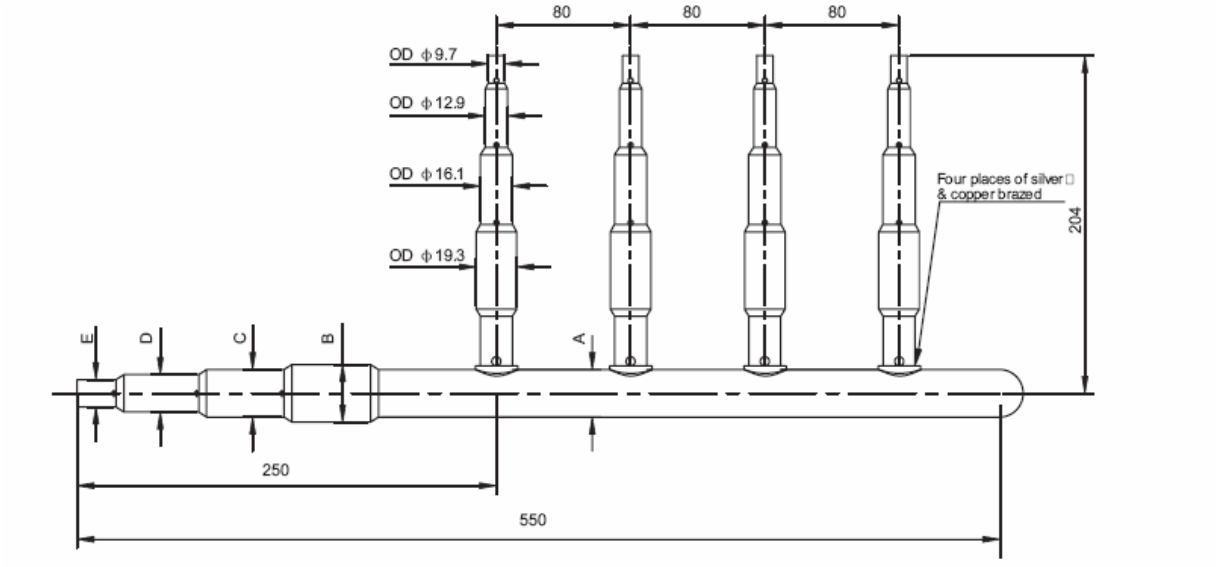
Refnet	Inner diameter (mm)		
	A	B	C
MDS-Y6	16.1	19.3	22.4
MDS-Y7	35.2	32.2	–



Dimension of refnet model MDS-Y5-A, MDS-Y6-A and MDS-Y7-A



Distributor MDS-C1



Refnet □ joint type□	Refnet joint type ϕ(mm)				
	A(outer□ diameter)□	B□	C□	D□	E□
MDS-C2□	28.6□	28.9□	25.7□	22.5□	19.5□
MDS-C3□	25.4□	25.7□	22.5□	19.3□	16.1□

Unit: mm

Distributor MDS-C2 and MDS-C3

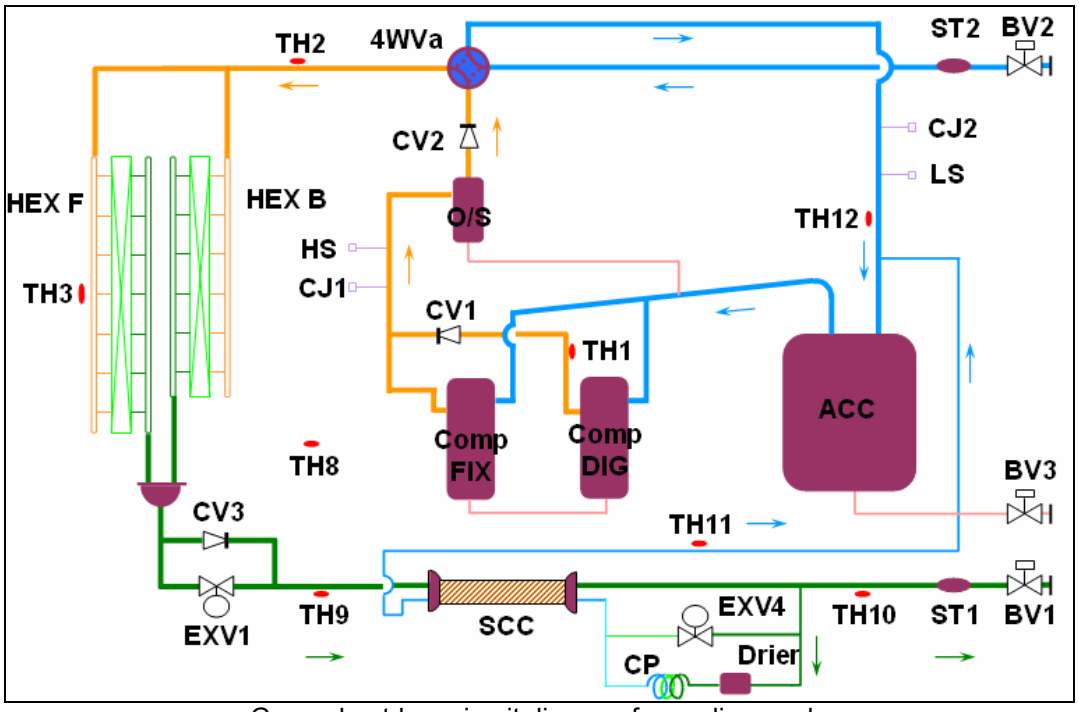
1.7 EXV Box (MEX)

For MDS system, every indoor has an individual EXV box which will control and regulate the refrigerant flow. Different indoor unit has different pipe size, therefore different EXV box model. Indoor models offered, together with their pipe diameter and respective EXV box model are shown in the table below:

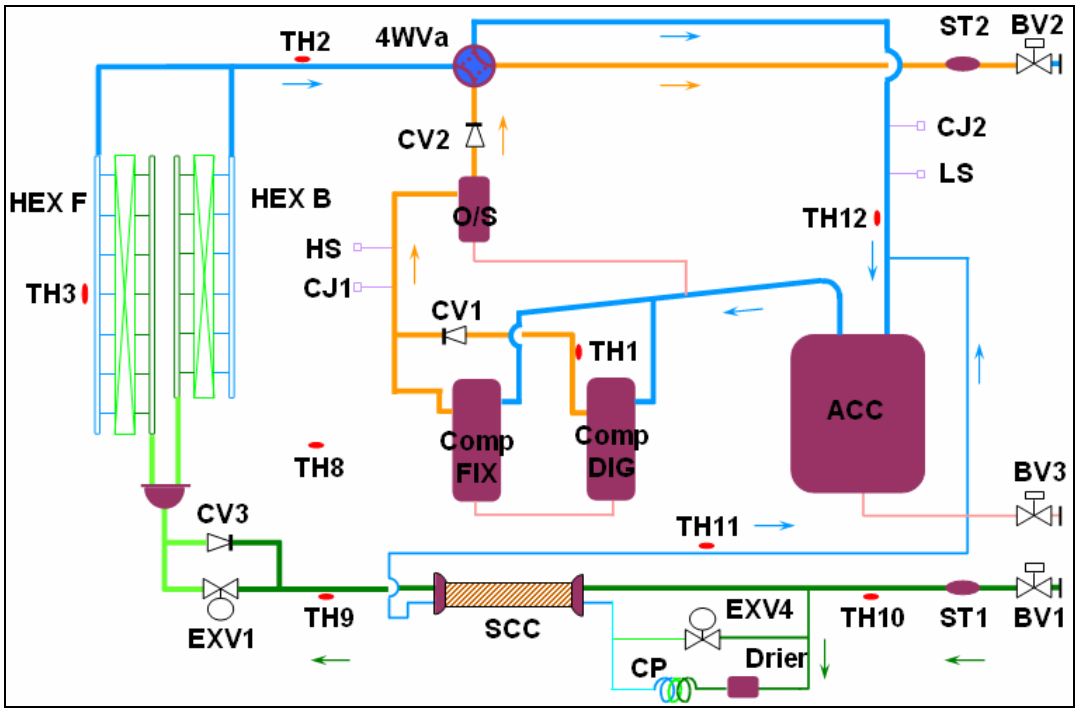
	Liquid Pipe Diameter (Inch)		MEX Model	
Indoor Model	**R-22**	**R-410A**	**R-22**	**R-410A**
MWMD 009G	1/4	1/4	MEX-15-2SAP-D	
MWMD 010G	1/4	1/4	MEX-15-2SAP-D	
MWMD 015G	1/4	1/4	MEX-15-2SAP-D	
MWMD 020G	1/4	1/4	MEX-18-2SAP-D	
MWMD 025G	3/8	1/4	MEX-18-3SAP-D	MEX-22-2SAP-D
MCKD 010C	1/4	1/4	MEX-15-2SAP-C	
MCKD 015C	1/4	1/4	MEX-15-2SAP-C	
MCKD 020C	1/4	1/4	MEX-18-2SAP-C	
MCKD 020A	1/4	1/4	MEX-18-2SAP-C	
MCKD 025A	3/8	1/4	MEX-18-3SAP-C	MEX-22-2SAP-C
MCKD 030A	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCKD 040A	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCKD 050A	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 010C	1/4	1/4	MEX-15-2SAP-C	
MCCD 015C	1/4	1/4	MEX-15-2SAP-C	
MCCD 020C	1/4	1/4	MEX-18-2SAP-C	
MCCD 025C	3/8	1/4	MEX-18-3SAP-C	MEX-22-2SAP-C
MCCD 028C	-	3/8	-	MEX-22-3SAP-C
MCCD 030C	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 038C	-	3/8	-	MEX-22-3SAP-C
MCCD 040C	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 050C	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 060C	1/2	3/8	MEX-24-4SAP-C	MEX-24-3SAP-C
MCMD 015E	-	1/4	-	MEX-15-2SAP-C
MCMD 015E	1/4	1/4	MEX-18-2SAP-C	
MCMD 015E	3/8	1/4	MEX-18-3SAP-C	MEX-22-2SAP-C
MCMD 015E	3/8	3/8	MEX-18-3SAP-C	MEX-22-3SAP-C
MCMD 040D	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCMD 050D	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCMD 062D	1/2	3/8	MEX-24-4SAP-C	MEX-24-3SAP-C
MDBD 080	1/2	1/2	Built-in EXV available	
MDBD 100	1/2	1/2	Built-in EXV available	

2.1 MDS Outdoor System and Control

General Circuit Diagram



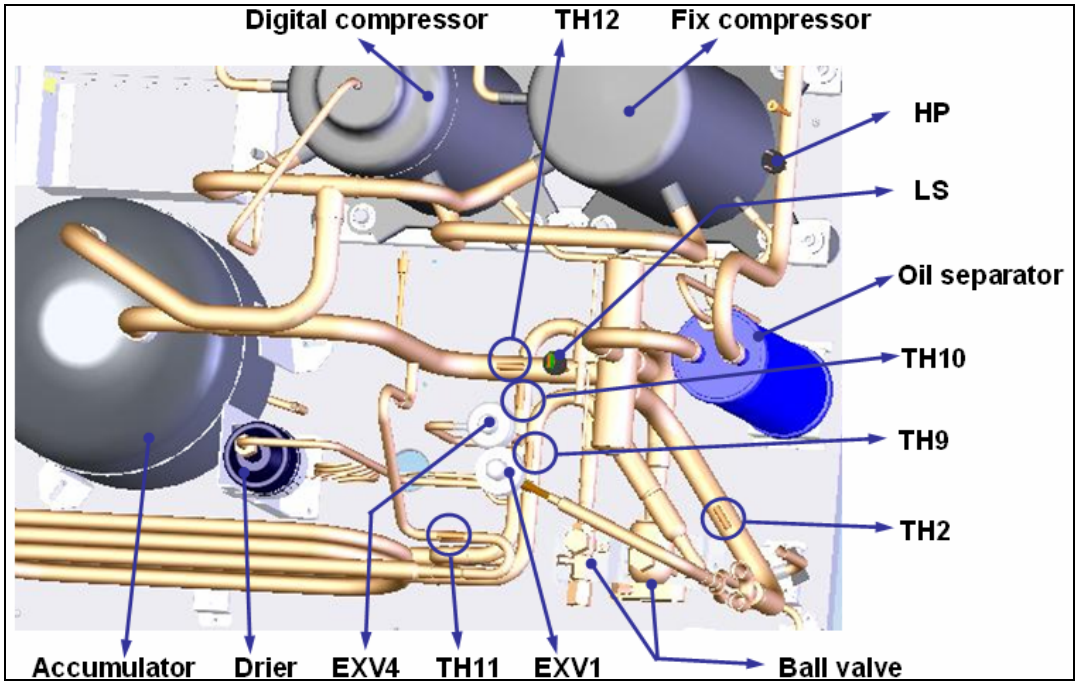
General outdoor circuit diagram for cooling mode



General outdoor circuit diagram for heating mode

Note: For more detailed refrigerant circuit diagram, please refer to Appendix 7.13.

Piping and Components Layout



General layout of MDS system piping and components

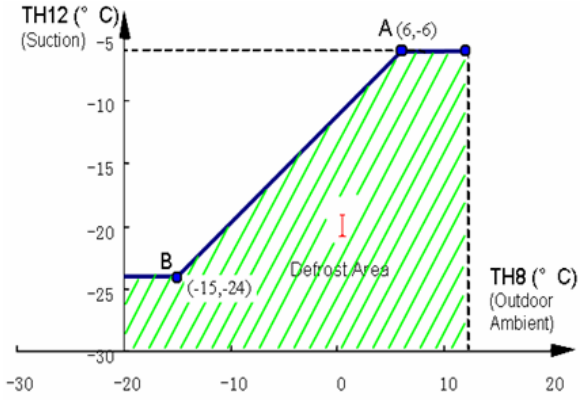
PWM Valve Control

PWM (Pulse Width Modulation) valve is an ON/OFF valve. When signal is send from outdoor PCB, the pulse voltage will react on the coil and generate a rotating magnetic field. This will allow the rotor to drives the valve to move up or down and hence opening or closing the valve.

EXV4 Control

EXV4 governs the sub-cool circuit of MDS system. It is controlled by the readings of temperature sensor TH9 and TH10. The difference between TH9 and TH10 is normally about 8 to 12ºC (cooling mode). For example, when the difference between TH9 and TH10 is very low, EXV4 will increase its opening step to maintain the sub-cool circuit.

Defrost Control



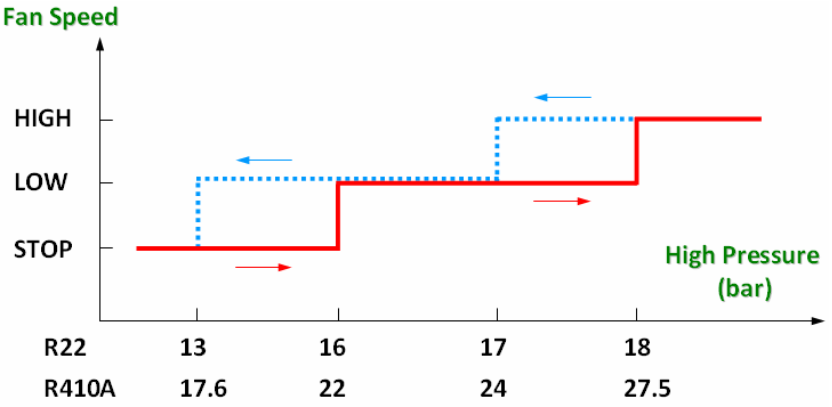
Defrost starts when:

1. After initial 1st heating cycle for 25 minutes and the intersection of TH8 & TH12 is fall in the "I" area for 3 minutes.
2. After initial continuous heating cycle for 45 minutes (45 minutes from previous defrost) and intersection of TH8 & TH12 is fall in the "I" area for 3 minutes.

Defrost will terminate if:

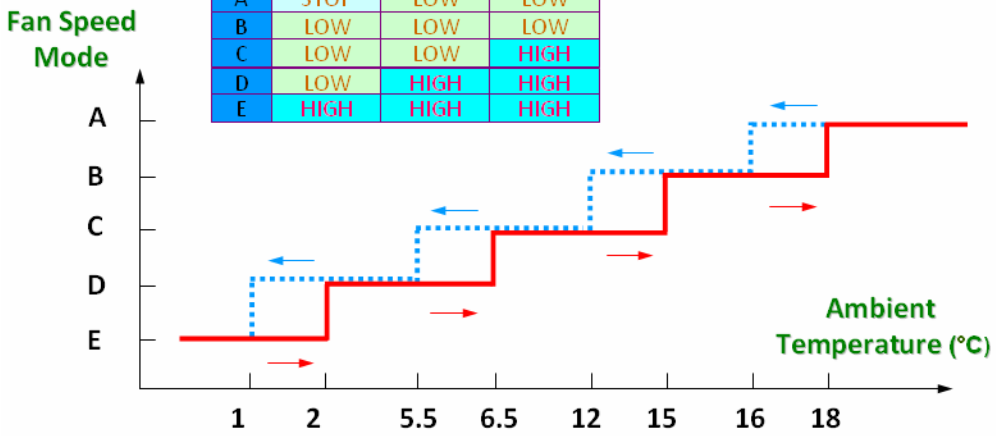
1. High pressure reading >19 bar (R22) OR >30 bar (436 psi) (R410A)
2. Unit entered to defrost mode for minimum 10 minutes
3. Unit entered to defrost mode for minimum 2 minutes & TH9 (temperature before SCC) is more than 15°C

Fan Speed Control



Outdoor fan speed control (cooling mode)

	≤30%	≤60%	≥60%
A	STOP	LOW	LOW
B	LOW	LOW	LOW
C	LOW	LOW	HIGH
D	LOW	HIGH	HIGH
E	HIGH	HIGH	HIGH



Outdoor fan speed control (heating mode)

Protection Devices

MDS system has several sensor and pressure switch for protection purpose:

- Discharge pressure protection (switch)
- Suction pressure protection (sensor)
- Discharge temperature protection for Digital Scroll Compressor
- Compressor overload protection
- Fan motor overload protection

Others

For Fix Scroll Compressor:

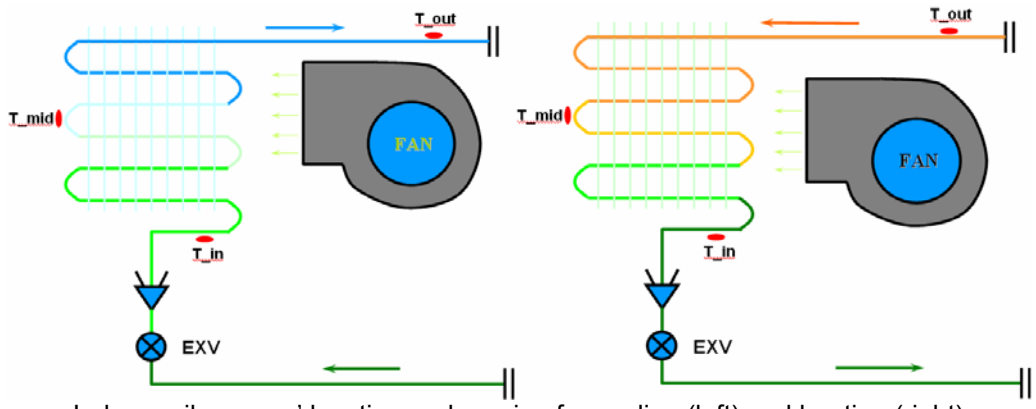
- Minimum 3 minutes of start-up delay protection is available.

For Digital Scroll Compressor:

- When digital compressor overloaded or discharge pressure too high, system will stop the outdoor for 3 minutes. System error will declare when outdoor unit stops for 3 times within 1 hour.
- TH1 ≤ 105ºC – outdoor unit operates normally.
- TH1 ≥ 130ºC – outdoor unit forced to stop.
- 105ºC ≤ TH1 ≤ 130ºC for 2 minutes, outdoor unit enter protection mode.

2.2 MDS Indoor System and Control

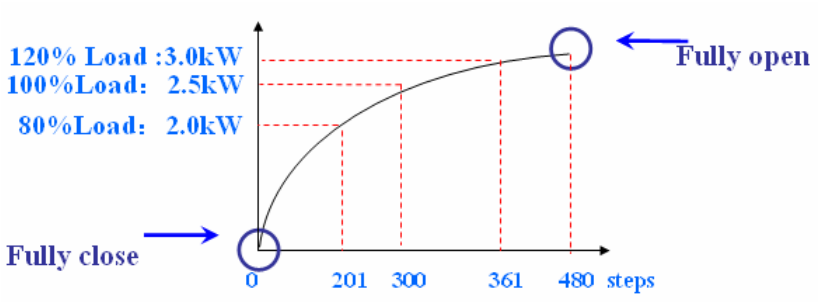
Sensor Location



Indoor coil sensors' location and naming for cooling (left) and heating (right)

The indoor unit for MDS system is slightly different with indoor unit of ordinary split system. For MDS indoor, there are additional sensors which allow precision control over temperature.

EXV Control



The modulation of indoor EXV is controlled by the readings of T_{in} and T_{out} of the indoor unit. Generally, the opening/modulation of indoor EXV is described by the number of steps, where each step refers to different EXV opening size. For example, if the indoor unit requires more cooling, the EXV steps will increase to allow more refrigerant to flow into the indoor.

Fan Speed Control

Fan Speed	Auto Fan Operation	Manual Fan operation
High Speed	$\Delta T \geq 3.4°C$	Fan Speed Set by User (Handset)
Medium Speed	$3°C > \Delta T \geq 2°C$	
Low Speed	$1.8°C > \Delta T$	

ΔT = | Room Temperature - Set Temperature |

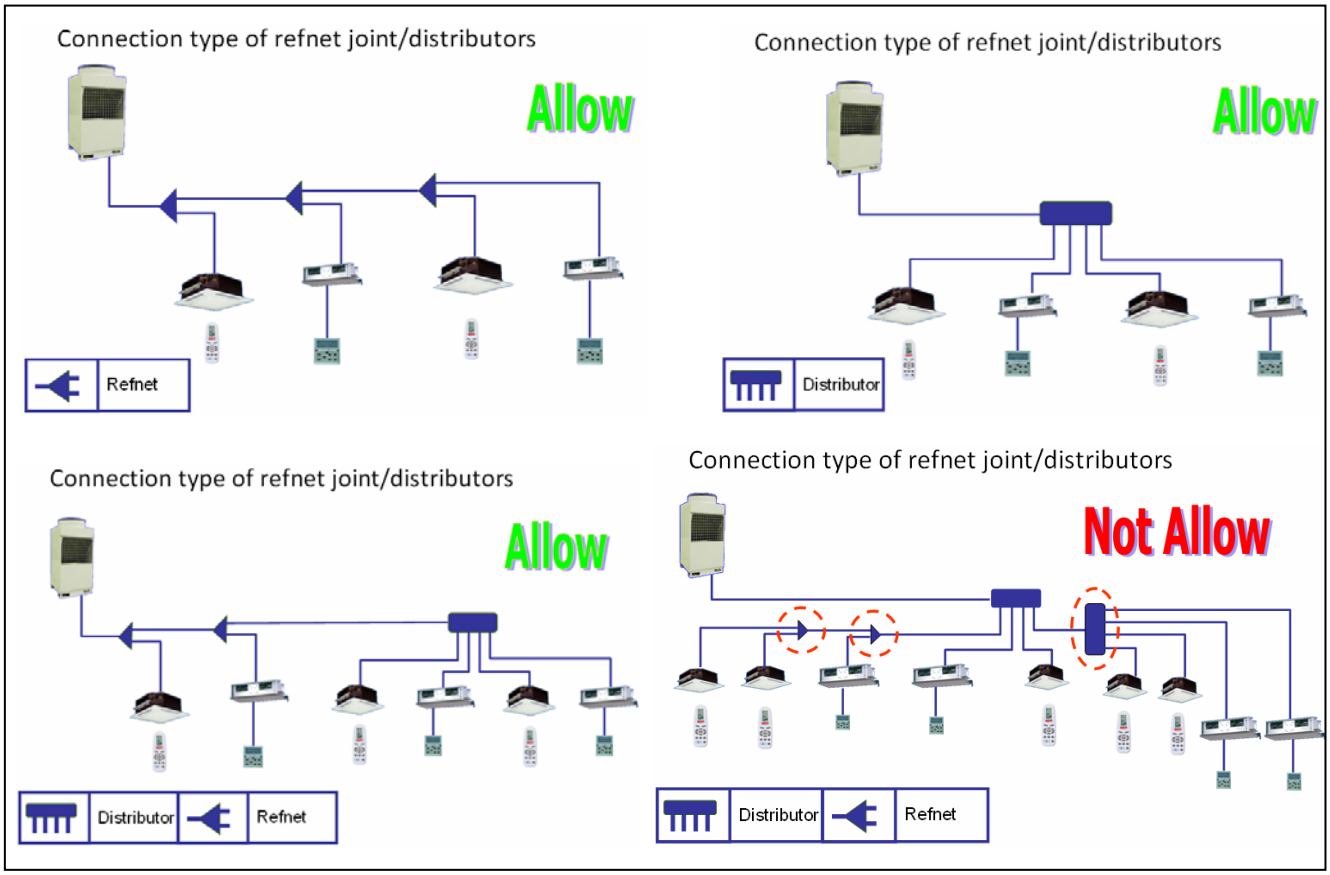
The table above shows the fan speed modulation when indoor fan speed is set to AUTO. It is applicable for both cooling and heating cycle. For heating mode, readings from sensor T_{mid} is used to control the fan speed.

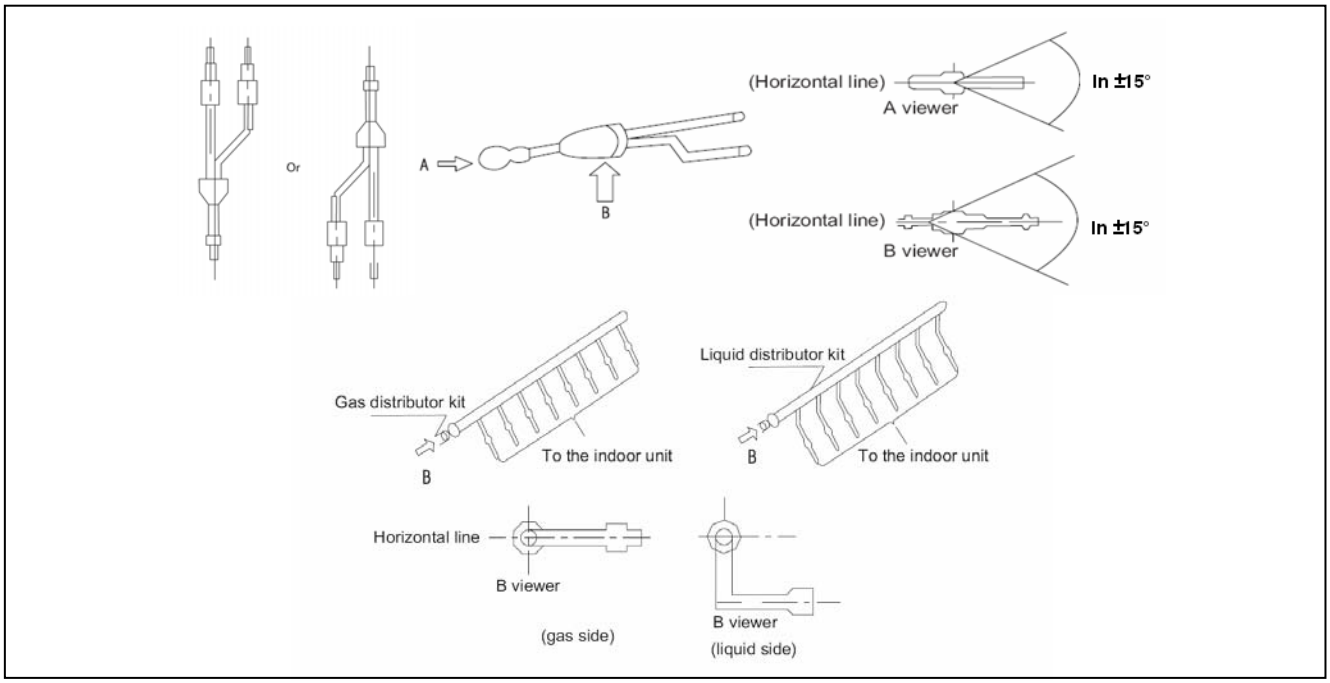
Anti-Freeze Protection

This protection is available during cooling and dry operation. Anti-freeze protection will activates when T_{mid} is ≤ -2ºC for 2 minutes. When anti-freeze protection activates, all EXV valve will close. Indoor anti-freeze will end when T_{mid} is ≥ 15ºC. All indoor unit will resume operation (EXV valve open) when this condition is achieved.

2.3 MDS System Piping Connection

MDS system provides multiple indoor unit installation through refnet and distributor connection. However, there are some limitations where installer should take note. Refer to the figures below, after the installation of distributor, the piping should directly connect to indoor unit and cannot be connected to other refnet or distributor. This is to prevent uneven refrigerant flow through the system and causing the system to become unbalance and affecting its performance. Do take note on the allowable tilting angle and orientation as well.

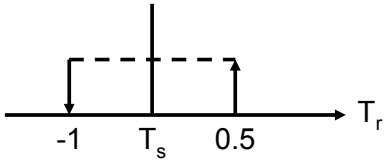




2.4 Heater Control

There is an optional heater for MDS indoor unit. However, this option is only applicable for ducted model (using wired controller) and it will function during heating cycle or fan mode. (Please refer to page 48 for dipswitch setting on heater application). User can choose to install one or two heaters. The control algorithm of the heaters is shown below:

1 Heater



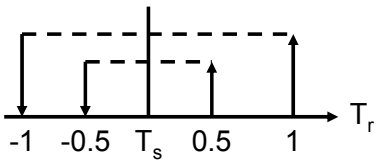
When the set temperature (T_s) is higher than room temperature (T_r) by 0.5°C, the heater will be turned ON.

(Ts - Tr > 0.5)

When the set temperature (T_s) is lower than room temperature (T_r) by 1°C, the heater will be turned OFF.

(Ts - Tr < -1)

2 Heater



Heater 1

When the set temperature (T_s) is higher than room temperature (T_r) by 0.5°C, the heater will be turned ON.

(Ts - Tr > 0.5)

When the set temperature (T_s) is lower than room temperature (T_r) by 0.5°C, the heater will be turned OFF.

(Ts - Tr < -0.5)

Heater 2

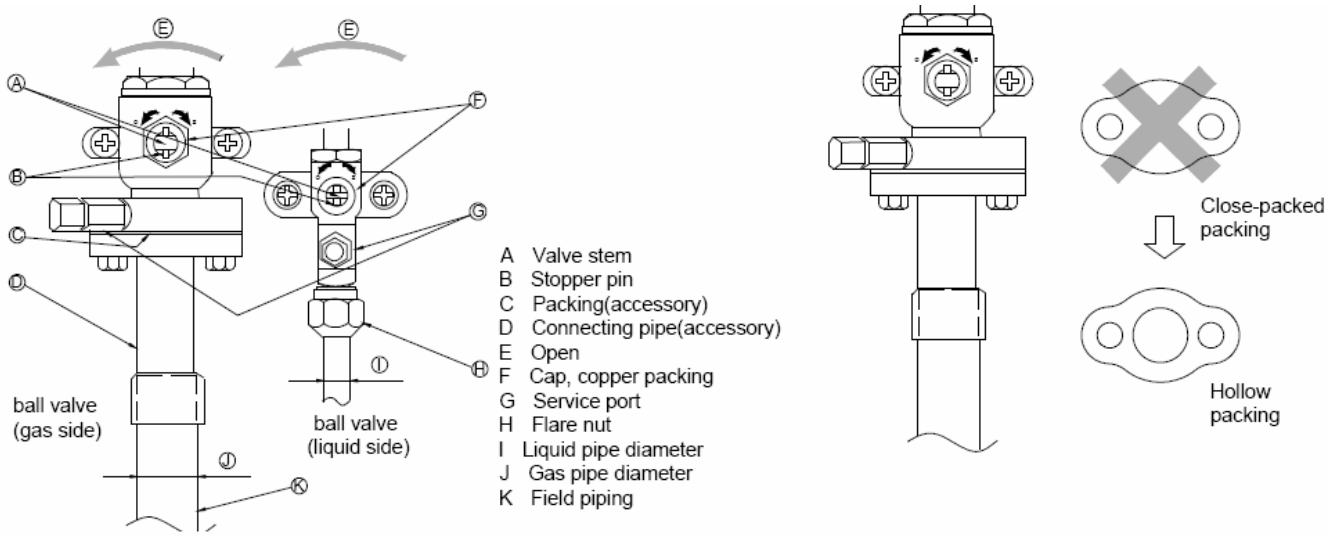
When the set temperature (T_s) is higher than room temperature (T_r) by 1°C, the heater will be turned ON.

(Ts - Tr > 1)

When the set temperature (T_s) is lower than room temperature (T_r) by 1°C, the heater will be turned OFF.

(Ts - Tr < -1)

2.5 Outdoor Ball Valve Operation



Other than installer, service personnel are often required to operate the ball valve during service and maintenance work. Ball valves operation steps are as follow:

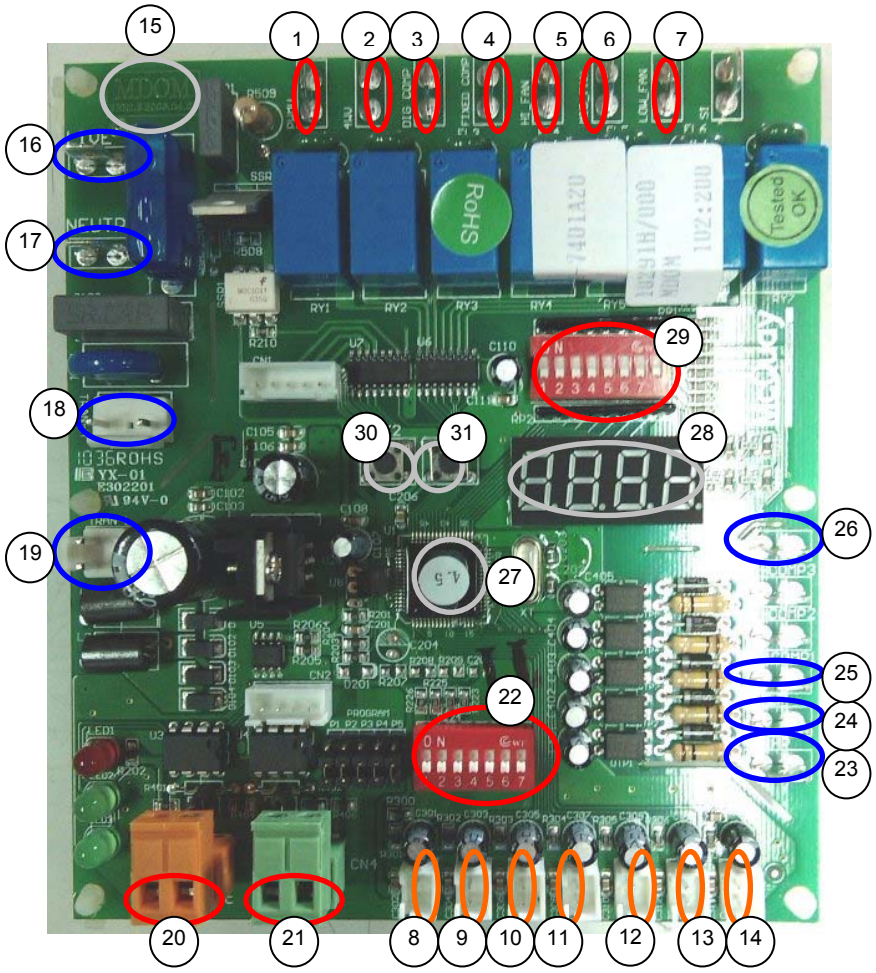
1. Operate the gas side ball valve
   - Uninstall the flange connector: remove the flange connector from the piping
   - Stick the seal material to cover the inlet of the ball valve flange to avoid the dirt entry
   - Change the hollow seal pad
   - Fix the flange connector and hollow seal pad and fixed ball valve of gas side with screw bolt.
2. Liquid side ball valve connecting: expand the copper tube outlet and connect the ball valve connector
3. Vacuum and charge in refrigerant, ensure to open the valve completely
4. Calculate the additional refrigerant and charge into units accordingly
5. Check the looseness to avoid leakage of refrigerant

3.0 PCB & Wiring

3.1 MDS Outdoor Unit PCB

There are two types of PCB for MDS outdoor unit, namely MDOM PCB and MDS-M PCB.

MDOM PCB

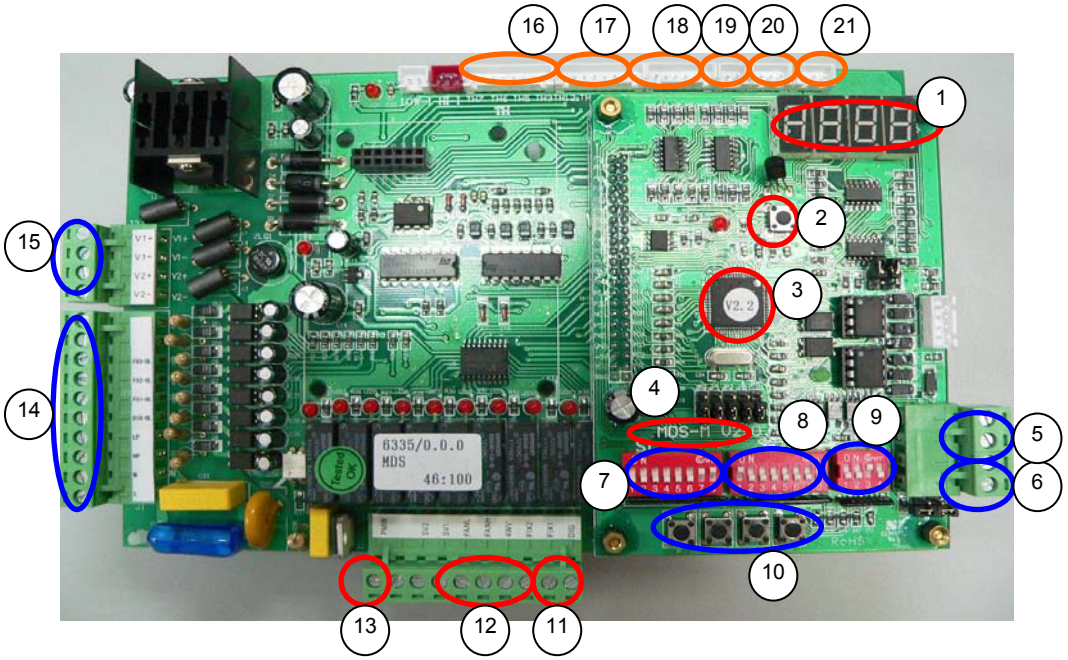


Remark:

No		No	
1	**PWM -** Pulse Width Modulation	17	**NEUTRAL**
2	**4WV -** Four way valve	18	**TRAN-H**
3	**DIG -** Digital compressor	19	**TRAN-L**
4	**FIX -** Fix compressor	20	**Orange Connector (B_{pc} A_{pc})**
5	**HI FAN**	21	**Green Connector (B_{in} A_{in})**
6	**MI FAN**	22	**Dipswitch J1**
7	**LO FAN**	23	**L-PRESS**
8	**DLT -** Digital compressor discharge sensor	24	**H-PRESS**
9	**OD -** Outdoor ambient sensor	25	**To LIVE**
10	**RTN -** Return air temperature sensor	26	**TO NEUTRAL**
11	**C_BTM -** Compressor bottom sensor	27	**PCB VERSION**
12	**INLET -** Inlet coil temperature sensor	28	**7 Segment LED Display**
13	**MIDLET -** Midlet coil temperature sensor	29	**Dipswitch J2**
14	**OUTLET -** Outlet coil temperature sensor	30	**K2 Button**
15	**MDOM PCB**	31	**K1 Button**
16	**LIVE**		

MDOM PCB is used in all MDS-A series outdoor unit and 5MDS 50/60/70B/BR. The figure above shows the locations for all dipswitches, buttons, electrical connections and sensor connections.

MDS-M PCB



Remark:

No		No	
1	**7 Segment LED Display**	14	**FX1-OL -** Fix compressor overload
2	**Reset Button**		**DIG-OL -** Digital compressor overload
3	**PCB Software Version**		**LP -** Low pressure switch
4	**MDS-M PCB**		**HP -** High pressure switch
5	**A_{in} & B_{in} (To indoor)**		**N -** Neutral
6	**A_{pc} & B_{pc} (Centralize Control)**		**L -** Live
7	**Dipswitch 1 (S1)**	15	**Transformer Output**
8	**Dipswitch 2 (S2)**	16	**TH7 -** Midlet coil temperature sensor (3^{rd})
9	**Dipswitch 3 (S3)**		**TH6 -** Inlet coil temperature sensor (3^{rd})
10	**K1, K2, K3 & K4 Buttons**		**TH5 -** Midlet coil temperature sensor (2^{nd})
11	**FIX -** Fix compressor		**TH3 -** Midlet coil temperature sensor (1^{st})
	DIG - Digital compressor	17	**TH12 -** Return air temperature sensor
12	**LO FAN**		**TH11 -** SCC bypass sensor
	HI FAN		**TH10 -** After SCC sensor
	4WV - Four way valve		**TH9 -** Before SCC sensor
13	**PWM -** Pulse Width Modulation	18	**TH8 -** Outdoor ambient sensor
			TH4 - Inlet coil temperature sensor (2^{nd})
			TH2 - Inlet coil temperature sensor (1^{st})
		19	**TH1 -** Digital compressor discharge sensor
		20	**LOW-U -** Low pressure
		21	**HI-U -** High pressure

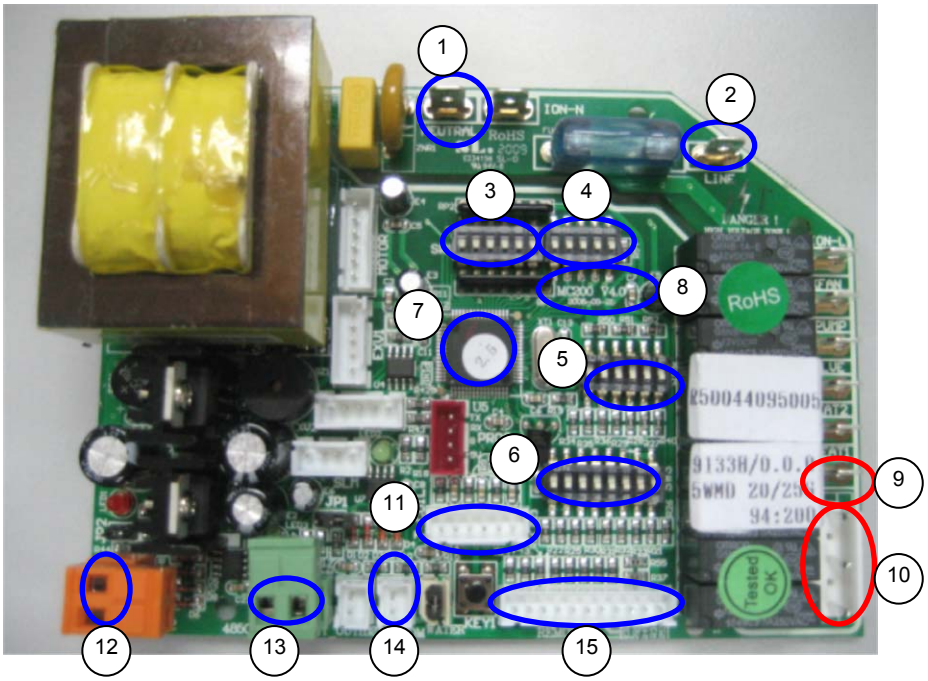
MDS-M PCB is used in all (5)MDS-B/BR series outdoor unit (except 5MDS 50/60/70B/BR). The figure above shows the locations for all dipswitches, buttons, electrical connections and sensor connections.

Remark: When K1 button is pressed, unit is forced to run defrost cycle. When K4 button is pressed (when unit in standby condition), all EXV valve will open. To exit these states, simply press on the Reset button.

3.2 MDS Indoor Unit PCB

There are two types of PCB for MDS indoor unit, namely MC200-C and MC201-C.

MC200-C

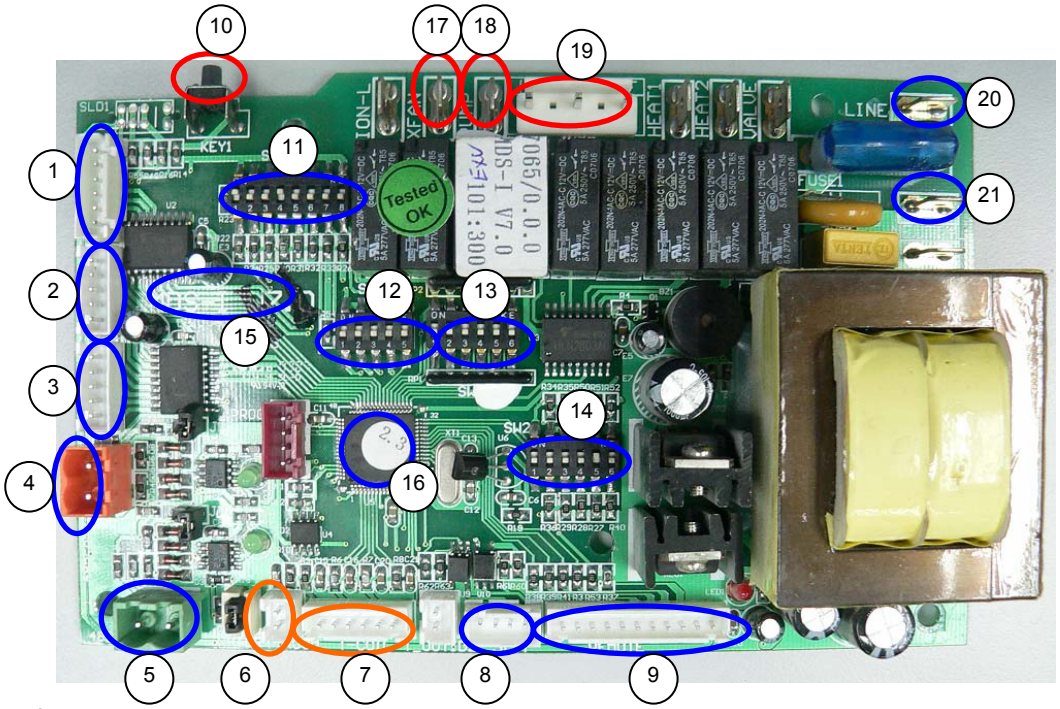


Remark:

No		No	
1	**NEUTRAL**	10	**Fan Motor** - HI FAN, MI FAN, LO FAN
2	**LIVE**	11	**T_IN** - Inlet coil temperature
3	**Dipswitch 1 (SW1)**		**T_MID** - Midlet coil temperature
4	**Dipswitch 4 (SW4)**		**T_OUT** - Outlet coil temperature
5	**Dipswitch 2 (SW2)**	12	**A_{pc} & B_{pc} (Centralize Control)**
6	**Dipswitch 3 (SW3)**	13	**A_{in} & B_{in} (Outdoor Communication)**
7	**PCB Software Version**	14	**T_Room -** Room temperature
8	**MC200-C**	15	**Display Board & IR Receiver**
9	**Swing**		

MC200-C PCB is only used by M(5)WMD 20/25G indoor unit. This PCB can be easily recognized by identifying the chamfered edge on the top right corner. The figure above shows the locations for all dipswitches, buttons, electrical connections and sensor connections.

MC201-C



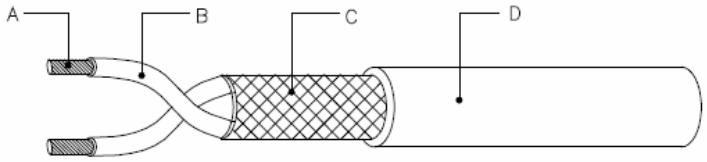
Remark:

No		No	
1	**Steping Motor**	11	**Dipswitch 3 (SW3)**
2	**EXV2**	12	**Dipswitch 4 (SW4)**
3	**EXV1**	13	**Dipswitch 1 (SW1)**
4	**A_{pc} & B_{pc} (Centralize Control)**	14	**Dipswitch 2 (SW2)**
5	**A_{in} & B_{in} (Outdoor Communication)**	15	**MC201-C PCB**
6	**T_Room** - Room temperature	16	**PCB Software Version**
7	**T_IN** - Inlet coil temperature	17	**Swing**
	T_MID - Midlet coil temperature	18	**Pump**
	T_OUT - Outlet coil temperature	19	**Fan Motor** – HI FAN, MI FAN, LO FAN
8	**MC301 Wired Hanset Connector**	20	**LIVE**
9	**Display Board & IR Receiver**	21	**NEUTRAL**
10	**Reset Button**		

MC201-C is a common PCB for all M(5)CKD-A/C, M(5)CMD-D/E, M(5)CCD-C, MDBD and M(5)WMD-G (except M(5)WMD20/25G) indoor unit. The figure above shows the locations for all dipswitches, buttons, electrical connections and sensor connections.

3.3 MDS System Wiring

The wiring for MDS is very critical as MDS is a system by itself. Generally, the wiring connection can be divided into wiring connection between MDS outdoor to indoor units, wiring connection between MDS outdoor units and wiring connection between MDS master and slave unit. The wire used for all will be the same.



Wire Structure

A: conducting wiring（copper, intersection surface is more than 0.5mm² or 20AWG）
B: Insulation material
C: Screen layer（efficiency shall be higher than 95%）
D: outside layer protector（PVC）

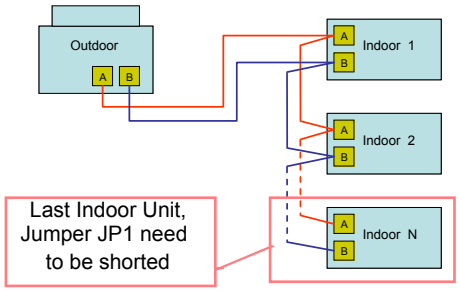
Note:

For wiring cable , refer to UL2547 and UL2791 standard;

A screen cable is recommended because the screen cable will help to filter the electrical noise along the communication wiring and thus help to maintain stability on the communication. For the MDS system, the communication protocol is using RS485. The wire length between first outdoor to last outdoor must not exceed 1000m, and the wire length between outdoor to last indoor also must not exceed 1000m.

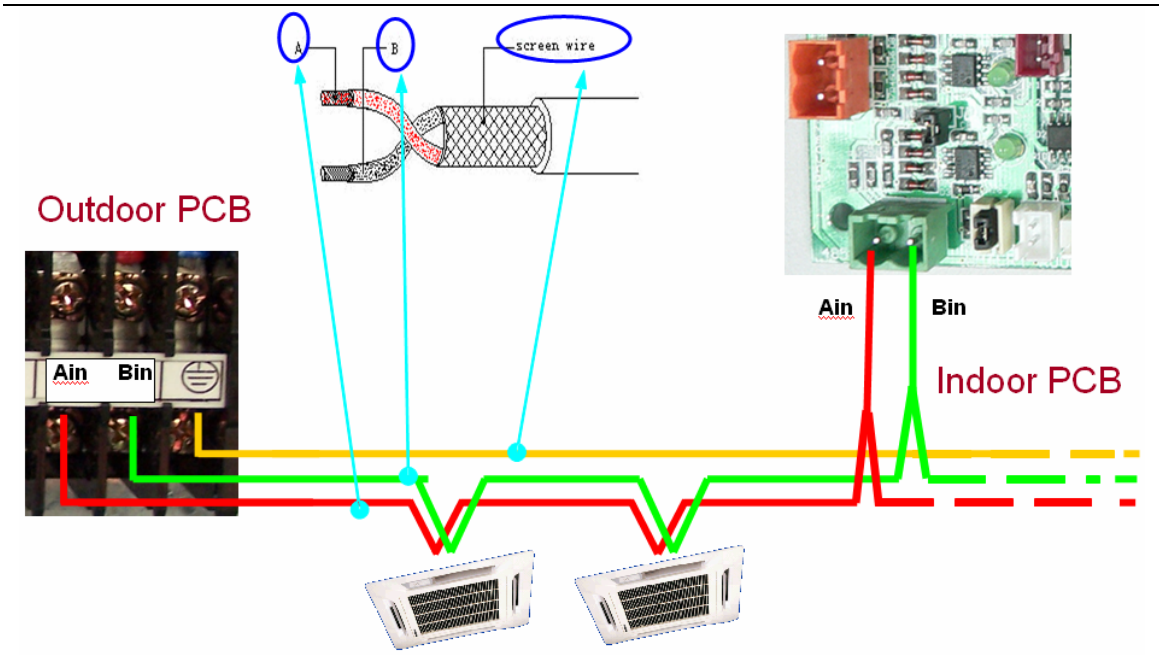
3.3.1 Wiring Connection Between MDS Outdoor to Indoor Units

As the MDS system is a single outdoor multiple indoors system, it is required to have communication wiring between the outdoor and all indoors. The wiring is required to be connected serially (Daisy chain) inside a conduit. Please take note that the communication wiring cannot mix inside a same conduit with power supply.



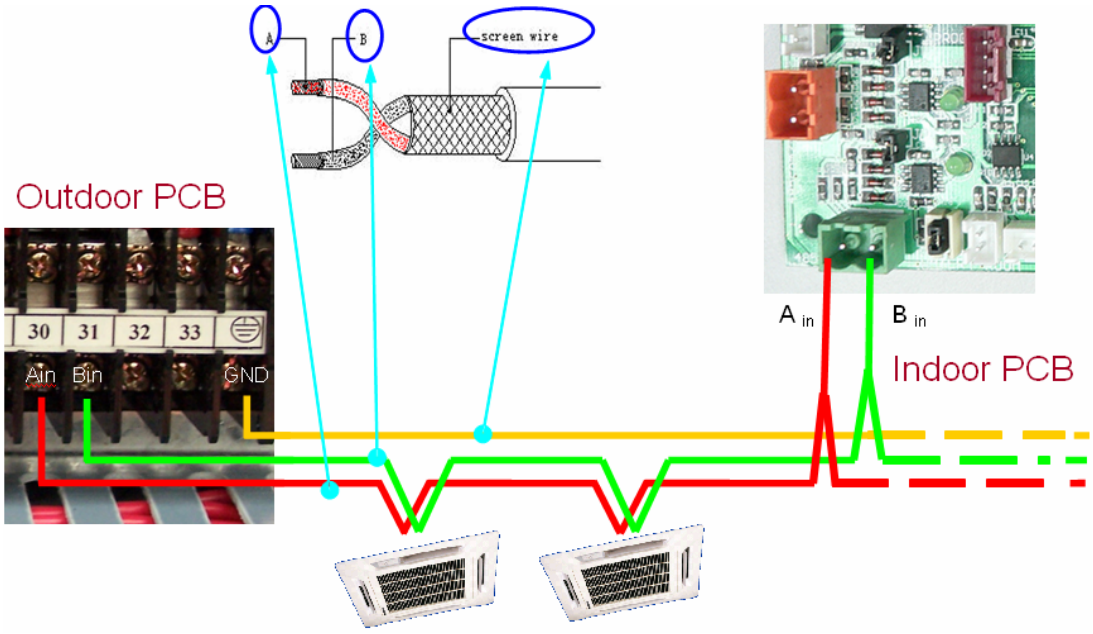
For outdoor model, there are two type of outdoor board (MDOM PCB and MDS-M PCB). However, the wiring connection for both PCB is basically the same. There are two wiring connectors located on the PCB, one of it is green color and the other is orange color. For outdoor to indoor communication, the communication wires need to be connected to the green terminal. The labels of the terminals are A_{in} and B_{in}.

MDOM PCB



For MDOM PCB, the communication terminals are already wired from the PCB to terminal block. Connect the wire accordingly (A_{in} outdoor to A_{in} indoor, B_{in} outdoor to B_{in} indoor) on the green color connector on indoor PCB.

MDS-M PCB

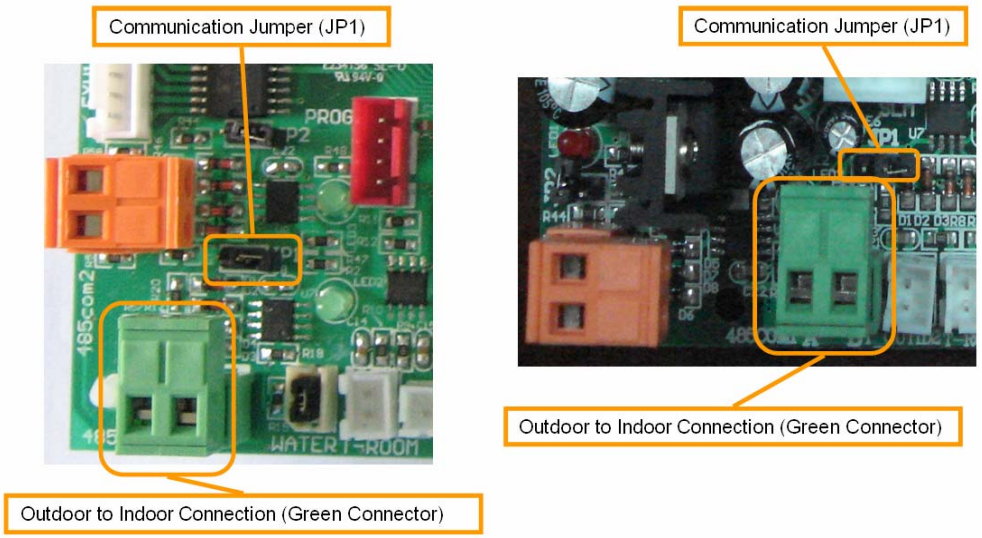


For MDS-M PCB, the communication terminals are also wired from the PCB to terminal block. Current models are having the label of A_{in} and B_{in} on the terminal block. However, older model has different terminal number (as shown below). Connect the wire accordingly (A_{in} outdoor to A_{in} indoor, B_{in} outdoor to B_{in} indoor) on the green color connector on indoor PCB.

R22 Model	Terminal Number for A_{in}	Terminal Number for B_{in}
MDS080/100/120/150B/BR	30	31
MDS180/200/220/240B/BR	45	46

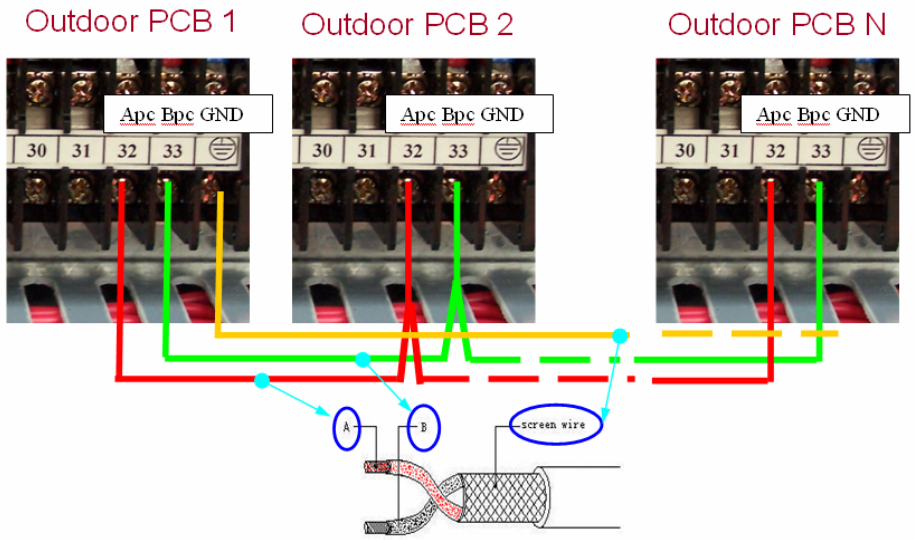
R410A Model	Terminal Number for A_{in}	Terminal Number for B_{in}
5MDS080/100/120/140/160/180B/BR	30	31
5MDS200/220/240B/BR	45	46

For the last indoor unit, the communication jumper needs to be shorted. This is to indicate to the outdoor unit that this is the last indoor unit. If the jumper is not shorted, the communication between the outdoor and indoor is not stable. It may cause the outdoor model to trip after some time of operation. The communication jumper is labeled with the name JP1 and the location is shown below.

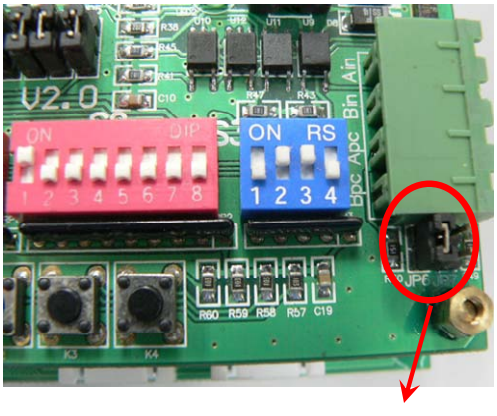


Location of jumper JP1 on indoor PCB MC200-C (left) and MC201-C (right)

3.3.2 Wiring Connection Between MDS Outdoor Units

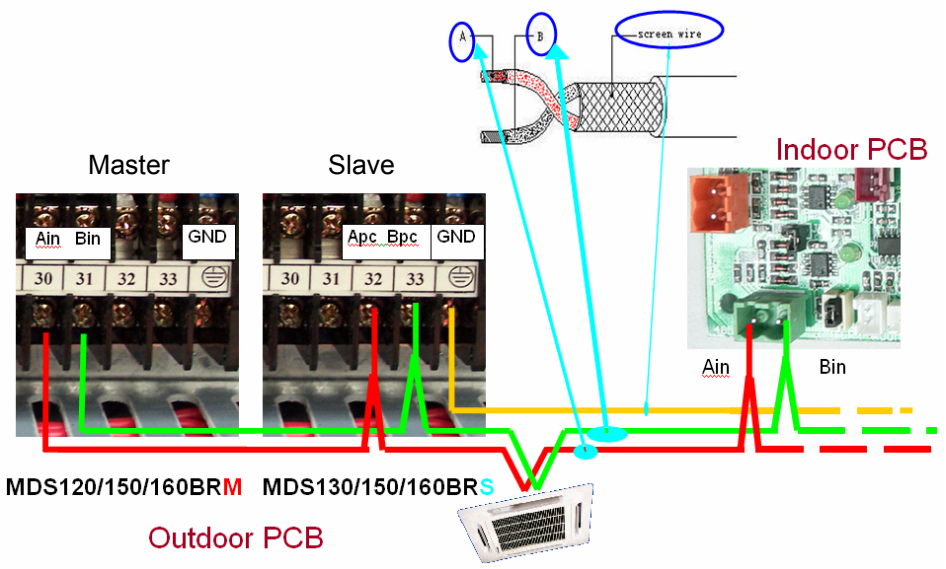


When more than one outdoor is to be connected together within a system, the wiring connection is connected as shown in the figure above. For MDS-M PCB, the jumper JP6 of the last outdoor unit within the system needs to be shorted (refer to figure below). This is to indicate to the software that this will be the last outdoor unit.



Short jumper JP6

3.3.3 Wiring Connection Between MDS Master and Slave Unit



For master & slave model, the communication connection is slightly different. From the master unit A_{in} & B_{in}, the communication wiring need to connect to the salve unit A_{pc} & B_{pc} before connect to the indoors. Similarly, to ease installation, these communication terminals are already wired from the PCB to terminal block. Different model has different terminal number.

R22 Model (Master Unit)	Terminal Number for A_{in}	Terminal Number for B_{in}
MDS120/130/150/160BM/BRM	30	31

R22 Model (Slave Unit)	Terminal Number for A_{pc}	Terminal Number for B_{pc}
MDS150/160BS/BRS	32	33

R410A Model (Master Unit)	Terminal Number for A_{in}	Terminal Number for B_{in}
5MDS120/180BM/BRM	30	31
5MDS240/250BM/BRM	45	46

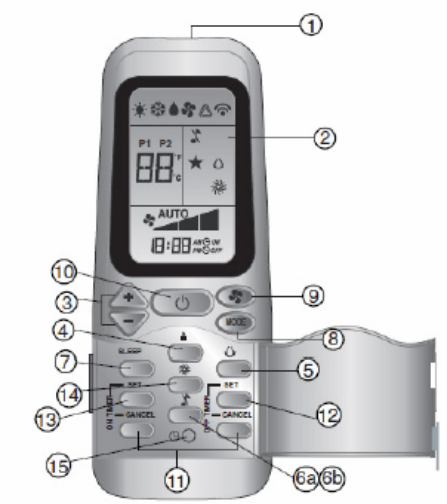
R410A Model (Slave Unit)	Terminal Number for A_{pc}	Terminal Number for B_{pc}
5MDS140/160/180BS/BRS	32	33
5MDS200/220/240/250BS/BRS	47	48

Note: For a large system which consist of a few units of Master and Slave MDS, it is advisable to short the jumper JP6 (on MDS-M PCB) on the first outdoor master unit and the last outdoor slave unit.

3.4 Handsets for MDS System

There are various types of handsets which can be used to control MDS indoor units. For decorative indoor unit (such as wall mounted, ceiling cassette and ceiling convertible), wireless handset will come as a standard controller. For ducted unit such as ceiling concealed and ducted blower, wired controller MC301 will come as standard handset. Furthermore, user may choose to use Central Controller MC303, which can connect up to 32 indoors to provide group control.

3.4.1 Wireless Handset G17



1. Transmission Source

2. Signal Transmission Indication
   - Blink to confirm that the last setting has been transmitted to the unit.

3. Temperature Setting
   - Temperature setting range is from 16°C to 30°C (optional setting 20°C to 30°C).

4. Personalize Setting
   - Press and hold for 3s, then P1 will blink. Press again to cycle between P1 and P2.
   - Set the desire setting, then leave the handset for 4s without pressing any key and it will save the setting into the program.
   - Press once to activate the P1 setting, press again to cycle between P1 and P2.
   - Press any key to deactivate the personalize setting.

5. Automatic Air Swing (optional)
   - Press the SWING button to activate the automatic air swing function. Press again to stop the louver at the desired direction.

6. Ionizer Function (For WM - G series only)
   - Press button to activate the negative ion function, which will refresh the indoor air effectively.

7. Sleep Mode Setting
   - This function is available under COOL, HEAT and AUTO mode.
   - When under cooling mode, the set temperature is increased by 0.5°C after 30 minutes, 1°C after an hour, and 2°C after 2 hours.
   - When under heating mode, the set temperature is decreased by 1°C after 30 minutes, 2°C after an hour, and 3°C after 2 hours.

8. Operating Mode
   - Press the MODE button to select the type of operating mode.
   - For cooling only unit, the available modes are: COOL, DRY and FAN.

9. Fan Speed Selection
   - Press the button continuously will toggle the fan speed in the following order:
     Low ⟶ Med ⟶ High ⟶ Auto
   - Stop pressing when the desired fan speed appears on the display screen.

10. “ON/OFF” Button

11. Timer Cancel

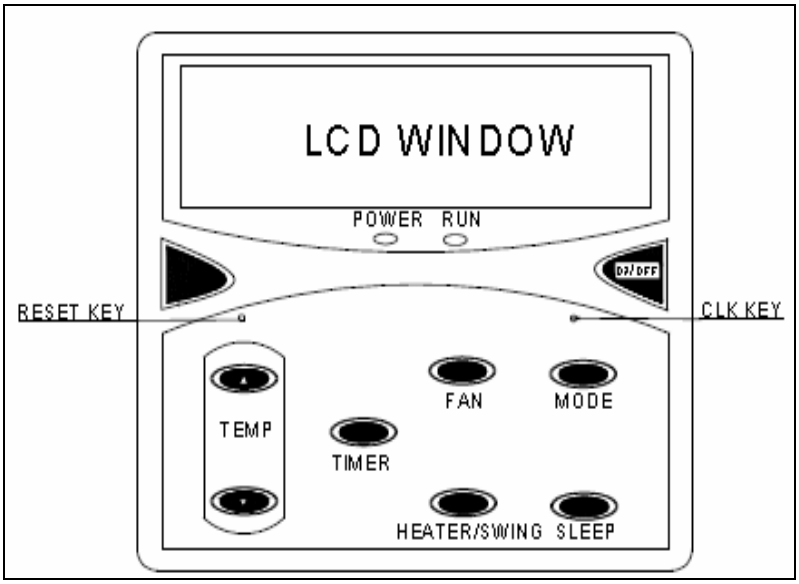
12. OFF Timer Setting

13. ON Timer Setting

14. Turbo Function
    - Press for fast cooling.
    - Fan speed turn to maximum speed.
    - Press again to deactivate the function.

15. Clock Time Setting
    - Press and hold to set the clock time.

3.4.2 Wired Controller MC301



1. ON/OFF Operation
   - Press “ON/OFF” key, the unit will be ON or OFF, and “ON” or “OFF” will display on the LCD.

2. Temperature Setting
   - Use “▲” or “▼” keyboard to increase or decrease by 1 °C/°F, temperature range is 16-30 °C (61-86°F).
   - Press “FAN” for 5s to alter between °C and °F.

3. Fan Speed Setting
   - Press “FAN” key to adjust fan speed follows by: High→Auto→Low→Medium→High.
   - When the mode is “Fan”, there is no “Auto” speed. Single-speed fan motor has no this function.

4. Mode Setting
   - Press the “MODE” button, the current mode is twinkling. Press again to change mode as follows:
     When the outdoor unit is OFF:
     - Heat pump: COOL→HEAT→FAN→DRY
     - Cooling only: COOL→FAN→DRY

     When the outdoor unit is Cooling:
     COOL→FAN→DRY
     When the outdoor unit is Heating:
     HEAT→FAN

5. Swing Setting
   - Press “HEATER/SWING” key to active swing function (Only for swing unit). “SWING” will display on LCD.

6. Auxiliary Heater Setting
   - Under “HEAT” or “FAN” mode, press “HEATER/SWING” key to active heater. (Only for heater unit). “HEATER” will display on LCD.

7. Sleep Setting
   - Press “SLEEP” key, “SLEEP” will display on LCD, which means this function is active.

8. Keyboard Lock
   - Press “SLEEP” for 5s, the keyboard will be changed between locked and unlocked.
   - When it is locked, the lock icon will be shown on the LCD. At this time, only the ON/OFF key is valid.

9. Real Time Clock Setting

- Press “CLK” to enter, firstly is “week setting”; press “▲” or “▼” to change from Sunday to Saturday. If there is no any press for 5s on any key, it will exit to the displaying status.
  Press “CLK” again is the “CLOCK SET” icon will display and the current real time clock is twinkling. At this time, press “▲” to increase the hour, press “▼” to increase minutes , if there is not any press for 5s, it will exit without saving the changed real time. If you want to confirm the new setting, you need to press “CLK” once again within 5s.
- During setting, only “▲”, “▼” and “CLK” are valid. If other key is press, it will exit to normal status.

10. Reset

- This key is used to reset the unit.

11. Timer Setting

- Week timer setting: Include total 28 on/off timers, 7 days every week and 4 timers every day.
- Single timer setting: It is active only on the same day that timer set when power on. It is inactive when timer is set at AM 00:00. It can be set at AM 00:00 if you want to cancel some timer setting.
- Press “FAN” and “MODE” at one time, all timers setting can be cancelled.
- Timer display: The current timer setting will display every 2s.
- The third bit of the K1(micro-switch) of PCB board must be set ON if PCB has clock chip and battery, otherwise the real time clock will not be activated once power is shut off.

A) Week Timer Setting

- Press “TIMER” , “WEEK SET” and “TIMER SET” will display on the left and bottom of LCD panel, press “▲” or “▼” to select a day (Sunday to Saturday), press “TIMER” again, the day is selected, the timer’s states of the selected day will display on LCD Panel.
- Enter first timer setting, the timer ON or OFF icon will display on the left and bottom of LCD panel, the timer sequence number “1” will display on the top of LCD, press “▲”or “▼” to select timer sequence number, press “TIMER”, the timer sequence number is selected.
- Enter timer ON and timer OFF setting, press “▲” or “▼” to select timer ON or timer OFF, “TIMER ON” or “TIMER OFF” is twinkling, Press “TIMER”, timer ON or timer OFF is selected.
- Enter timer setting, “TIMER SET” and “CLOCK SET” will display on the left and bottom of LCD panel, press “▲” to set hour and press “▼” to set minute, press “TIMER” again to finish setting and enter next timer setting, repeat above procedures to finish others timer setting.

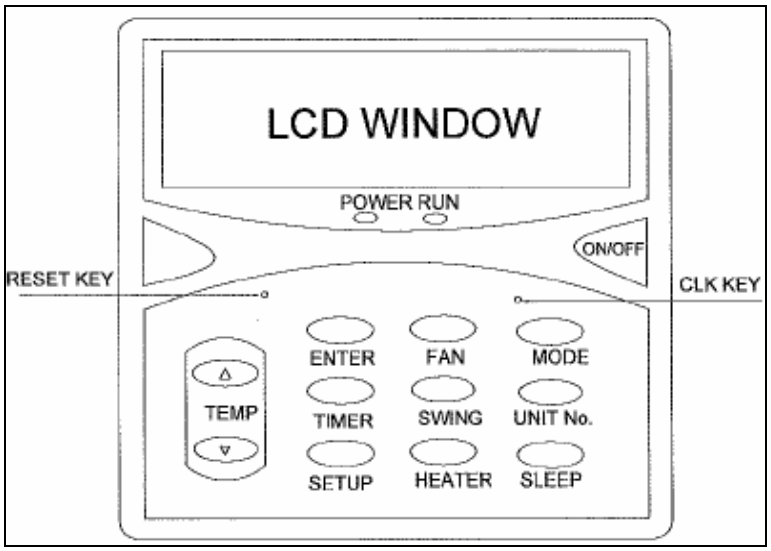
B) Single Timer Setting

- Press “TIMER” key for 5s, enter single timer setting (When the unit is ON, it can only be set to OFF; When the unit is OFF, it can only be set to ON), the “TIMER SET” will display on LCD panel, press “▲” to set hour and press “▼”to set minute, press “TIMER” to finish the single timer setting.
- Exit timer setting: If there is no press on any key within 5s or press any key except “▲”, “▼”, “TIMER” and “ON/OFF” key, it will exit the timer setting.

Remark 1: When using Wired Controller MC301 on decorative indoor, existing IR receiver and LED display on the indoor PCB has to be removed.

Remark 2: Maximum wire length between unit and wired controller is 10m.

3.4.3 Central Controller MC303



1. Address Register
   - After communication wire is completely connected, press “SETUP” key for 5s. Address will be automatically registered and a number from 60 to 0 will be shown on the display LCD.

2. View Actual Address
   - Press “MODE” key for 5s then press “▲” or “▼” to view all the units.
   - Actual address has four figures; first two where show on minute previously are for outdoor unit, last two where show error previously at the right bottom corner are for indoor unit.

3. Single/Group Unit Setting
   - Press “UNIT No.” key to enter the unit setting, then press “▲” or “▼” to choose the unit number to be set and press “ENTER” to confirm choosing.
   - When LCD panel show “_ _”, press “ENTER” to confirm enter group setting.

4. ON/OFF Operation
   - Press “ON/OFF” key to RUN or STOP the unit operation.
   - For Group On/Off, press “ON/OFF” key for 5s and the unit number is twinkling, “[ ]” is displayed on LCD panel. Then press “ON/OFF” key to turn on/off all units.

5. Mode Setting
   - Press the “MODE” button, the current mode is twinkling. Press again to change mode as follows:
     When the outdoor unit is OFF:
     - Heat pump: COOL→HEAT→FAN→DRY
     - Cooling only: COOL→FAN→DRY

     When the outdoor unit is Cooling:
     COOL→FAN→DRY
     When the outdoor unit is Heating:
     HEAT→FAN

6. Temperature Setting
   - Use “▲” or “▼” keyboard to increase or decrease by 1 °C/°F, temperature range is 16-30 °C (61-86°F).
   - Press “FAN” for 5s to alter between °C and °F.

7. Fan Speed Setting
   - Press “FAN” key to adjust fan speed follows by:
     High→Auto→Low→Medium→High
   - When the mode is “Fan”, there is no “Auto” speed. Single-speed fan motor has no this function.

8. Swing Setting
- Press “SWING” key to active swing function. “SWING” will display on LCD.

9. Sleep Setting
- Press “SLEEP” key, “SLEEP” will display on LCD, which means this function is active.

10. Indoor unit lock/unlock
- Press “UNIT No.” key to enter the unit setting, then press “▲” or “▼” to choose the unit number to be set or choose “_ _” for group setting and press “ENTER” to confirm. After that, press “SLEEP” key 5s to lock the chosen unit, the symbol “” will display on LCD panel, any operation by LCD panel or remote controller is invalid.
- To unlock the unit, press “SLEEP” key 5s, the symbol “” will disappear.

11. Real Time Clock Setting
- Press “CLK” to enter, firstly is “week setting”; press “▲” or “▼” to change from Sunday to Saturday. If there is no any press for 5s on any key, it will exit to the displaying status.
- Press “CLK” again is the “CLOCK SET” icon will display and the current real time clock is twinkling. At this time, press “▲” to increase the hour, press “▼” to increase minutes , if there is not any press for 5s, it will exit without saving the changed real time. If you want to confirm the new setting, you need to press “CLK” once again within 5s.
- During the setting process, only “▲”, “▼” and “CLK” are valid. If other key is press, it will exit to the normal status.

12. Timer Setting

A) Single Timer Setting
- Single timer setting: It is active only on the same day that timer set when power on. It is inactive when timer is set at AM 00:00. It can be set at AM 00:00 if you want to cancel some timer setting.
- Press “TIMER” key for 5s, enter single timer setting (When the unit is ON, it can only be set to TIMER OFF; When the unit is OFF, it can only be set to TIMER ON), the “TIMER SET” will display on LCD panel, press “▲” to set hour and press “▼”to set minute, press “TIMER” to finish the single timer setting.

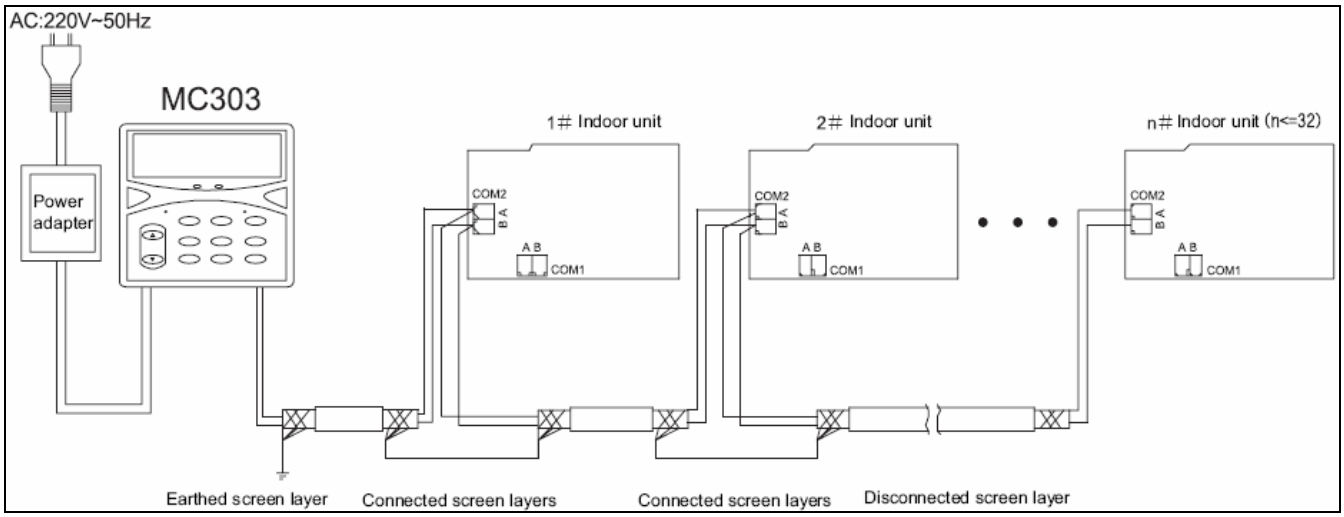
B) Week Timer Setting
- Week timer setting: Include total 28 on/off timers, 7 days every week and 4 timers every day.
- Press “TIMER” , “WEEK SET” and “TIMER SET” will display on the left and bottom of LCD panel, press “▲” or “▼” to select a day (Sunday to Saturday), press “TIMER” again, the day is selected, the timer’s states of the selected day will display on LCD Panel.
- Enter first timer setting, the timer ON or OFF icon will display on the left and bottom of LCD panel, the timer sequence number “1” will display on the top of LCD, press “▲”or “▼” to select timer sequence number, press “TIMER”, the timer sequence number is selected.
- Enter timer ON and timer OFF setting, press “▲” or “▼” to select timer ON or timer OFF, “TIMER ON” or “TIMER OFF” is twinkling, Press “TIMER”, timer ON or timer OFF is selected.
- Enter timer setting, “TIMER SET” and “CLOCK SET” will display on the left and bottom of LCD panel, press “▲” to set hour and press “▼” to set minute, press “TIMER” again to finish setting and enter next timer setting, repeat above procedures to finish others timer setting.
- Press “SWING” for 5s, all week timer setting in EEPROM will be deleted.
- Exit timer setting: If there is no press on any key within 5s or press any key except “▲”, “▼”, “TIMER” and “ON/OFF” key, it will exit the timer setting.

13. Lock/unlock LCD Panel
- Press “HEATER” and “SLEEP” key for 5s, the symbol “” will twinkles on LCD panel, MC303 is locked. Any key of MC303 is invalid until “HEATER” and “SLEEP” key is pressed for 5s again.
- While LCD panel is locked, MC303 still checks and displays each indoor’s unit status.

Remark: Timer is set to all indoor units. Individual indoor unit’s timer is unavailable.

3.4.4 Handsets Wiring

For Central Controller MC303, wiring work is needed between indoor units and the controller for communication purpose. The communication wire used should comply with UL2547 or UL2791 standard (refer to Section 3.3, page 18). Communication wire is wired from the controller to indoor units (through the orange connector, A_{pc} and B_{pc}) through daisy chain connection. One end of the screen layer should be earthed to protect the signal transmission. Kindly refer to the figure below for the illustration of the connection:



The length of the communication wire should not exceed 1000m. The Central Controller MC303 can be used with both MC200-C and MC-201C indoor PCB. To ensure stable communication, jumper JP2 should be shorted for the last indoor unit within the chain connection.

4.0 Commissioning Software

4.1 Introduction

Smart Commander is the MDS software use to perform commissioning and troubleshooting of MDS system. It is recommended that service personnel to use this software while commissioning MDS system.

Inside the commissioning kit from factory, it consists of a CD (Smart Commander Service Version), a USB Dongle Key (Purple), a MC501 gateway with power connection, a cable connected from the gateway to serial port and a manual.

4.2 Hardware Requirement

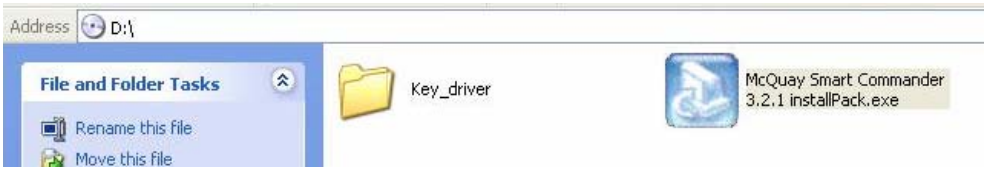
The hardware requirements for Smart Commander are as follow:

- The CPU main frequency is 800MHz or above.
- The memory is 256M or above.
- The free hard disk is 4G or above.
- Operating System: Windows XP / Vista / 7.
- The serial port or USB port is available.
- The monitor is larger than 15 inch, and 17 inch is recommended.

4.3 Installation of Smart Commander

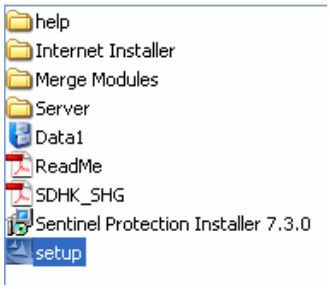
Step 1:
Prepare the CD

To set up the software, insert the CD into CD-ROM and run it. Please note that do not plug in the USB Dongle Key to the computer yet.

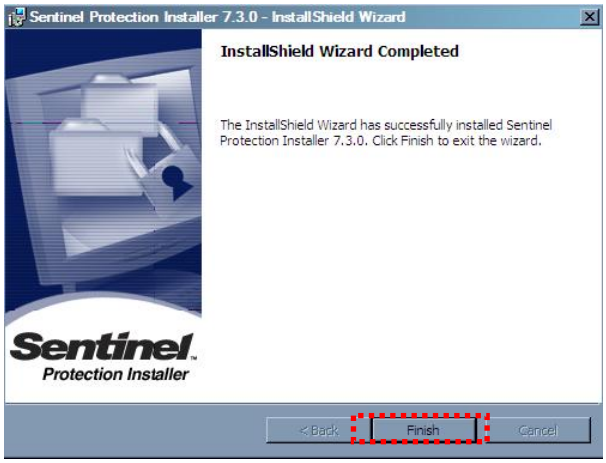


Step 2:
Install USB Dongle Key Driver

To set up the USB Dongle Key driver, the user is required to initiate the **setup** file in the **SPI730 folder**, which is located inside the **Key_driver folder**.



After initiated the setup file, just follow through the instruction on the prompt up screen to install the driver. Once the driver installation is completed, the following screen will appear. Click “finish” to complete the installation.



Step 3:
Install Smart Commander

Initiating the Smart Commander installation file and follow the instruction on the prompt up screen. Once the software installation is completed, the prompt up screen will disappear. In order to confirm whether the software is already installed or not, the user can checked it under the program location.

Step 4:
Run the program

To start up the software, user will need to insert the USB Dongle Key into the computer. This USB Dongle key is crucial as every time the Smart Commander is executed or in operation, the software will refer to this key. Only remove this after the Smart Commander software is closed. Take note that the **same USB port** must be used when running this key.

4.4 Wiring Connection

MC501 gateway acts as a bridge in converting and transmitting signals and allows communication between computer and MDS system. The wiring connection is basically divided into two sections:

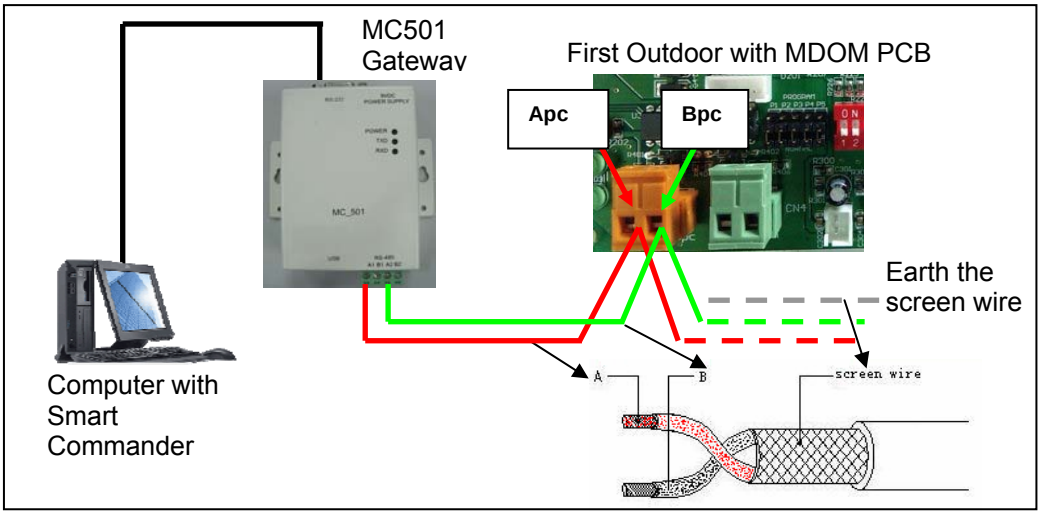
a) Wiring connection between outdoor and gateway (length must <1000m between last outdoor and gateway)
b) Wiring connection between gateway and computer (length must <2m)

For wiring connection between outdoor and gateway, the communication cable is directly connected from outdoor terminal to the gateway, where A_{pc} and B_{pc} (from outdoor) connect to A1 and B1 (on MC501 gateway) respectively. For certain models, the outdoor terminal will be labeled with numbers instead of A_{pc} and B_{pc}. The corresponding numbers for A_{pc} and B_{pc} are as follow:

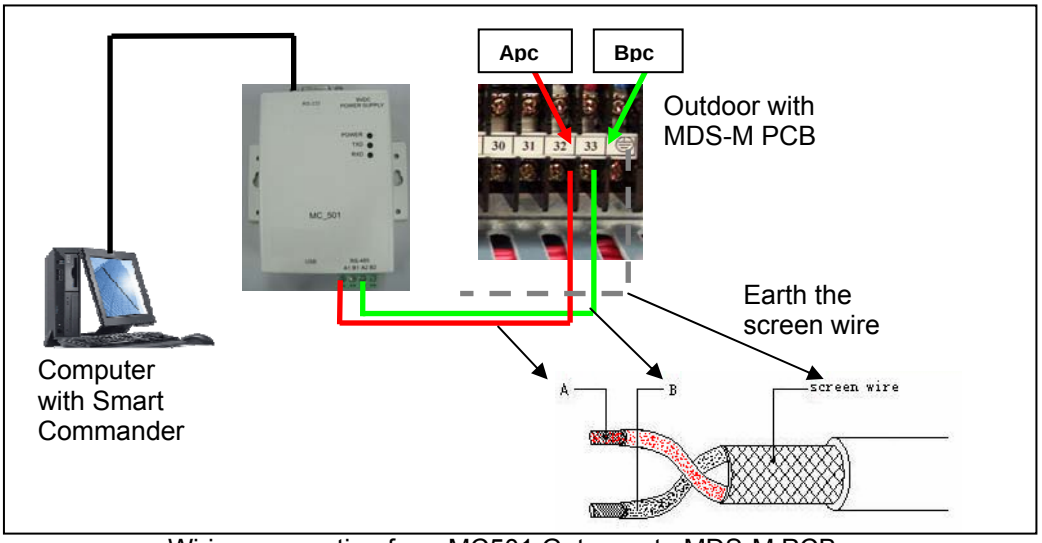
R22 Model	Terminal Number for A_{pc}	Terminal Number for B_{pc}
MDS80/100/120/150/260/280/300/320B/BR	32	33
MDS180/200/220/240B/BR	47	48

R410A Model	Terminal Number for A_{pc}	Terminal Number for B_{pc}
5MDS80/100/120/140/160/180/260/280/300/320/340/360B/BR	32	33
5MDS200/220/240/380/400/420/440/460/480/500B/BR	47	48

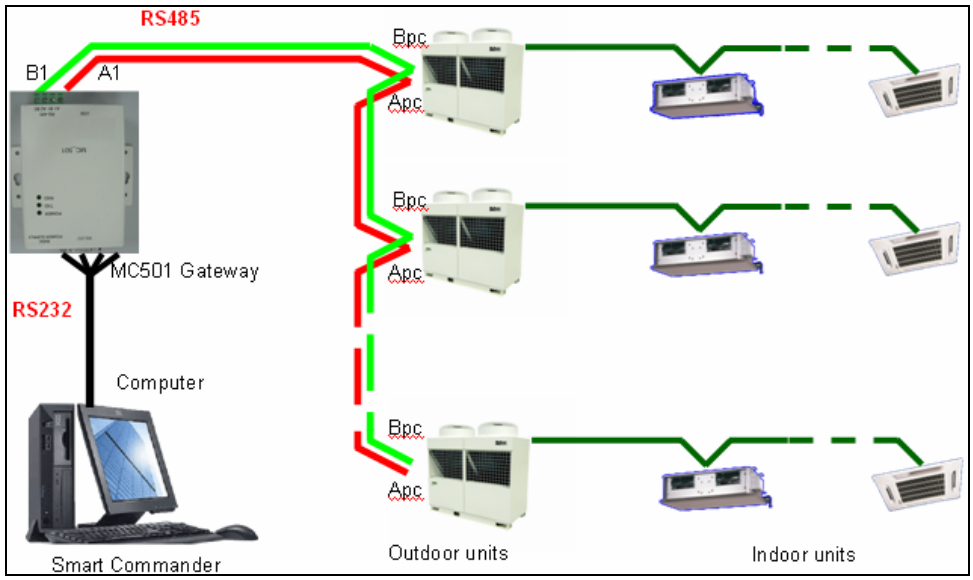
The wiring connection between MC501 gateway and MDS system is as follow:



Wiring connection from MC501 Gateway to MDOM PCB

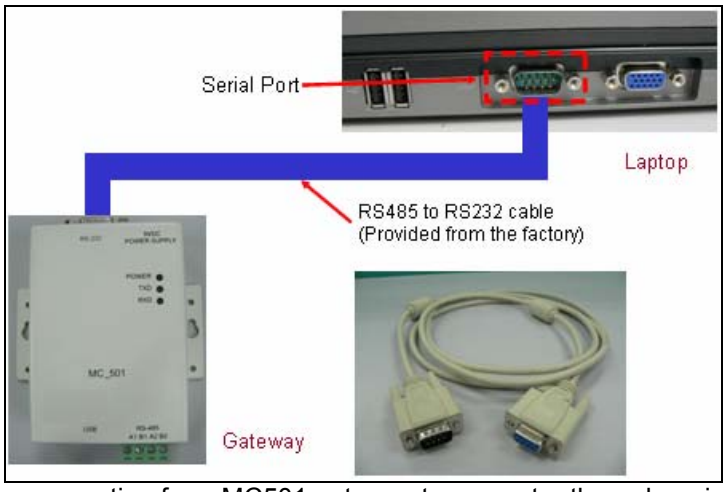


Wiring connection from MC501 Gateway to MDS-M PCB

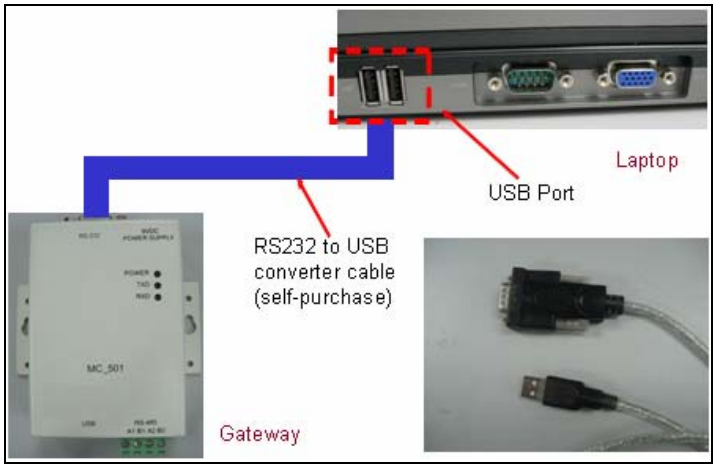


Wiring connection for MDS system with more than one outdoor unit

For wiring connection between MC501 gateway and computer, it can be done by using the cable provided to connect the gateway to serial port of computer. If serial port is not available in the computer, a RS232 (Serial Port) to USB converter cable can be use. This converter cable can be obtained from any IT hardware outlet. When user purchased the RS232 to USB converter cable, it will come together with a CD which consist the driver. Kindly install the driver accordingly. (The interface will be different base on the supplier; hence this manual cannot give any guideline or any indication).



Wiring connection from MC501 gateway to computer through serial port



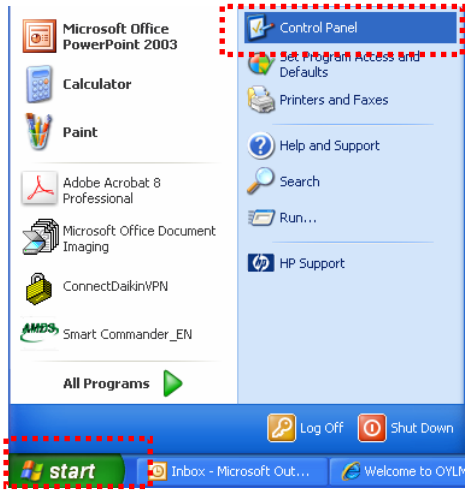
Wiring connection from MC501 gateway to computer through RS232 to USB converter cable

4.5 Setup of Smart Commander

After completing the wiring connection for MC501 gateway, setup process continue to determine the communication port which will be sending and receiving signals between computer and gateway. If you are using the serial port cable provided from factory, you may **jump straight to step 6** and set **COM 1** as your port number. If you are using the Serial port to USB converter cable, please go through all the following steps. The steps will be quite complicated. Hence, kindly read through before try out on the PC.

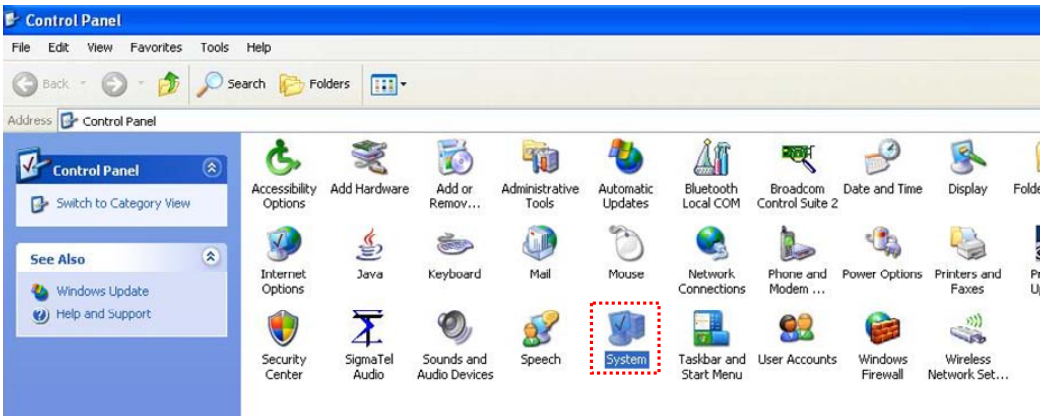
Step 1

Go to **Start** and select **Control Panel**.



Step 2

After click on the Control Panel, a new window will prompt up. Please select **System**.



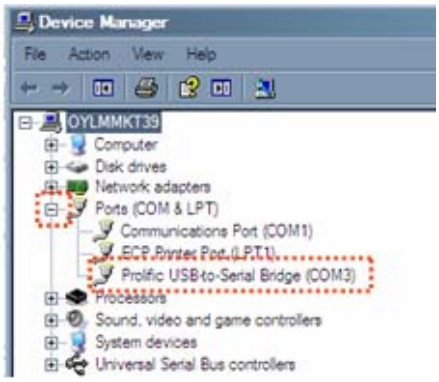
Step 3

Once the system icon is selected, another new screen will prompt up. Click on the **Hardware** on the tab menu. Once the window show the Hardware Menu, select **Device Manager**.

Step 4

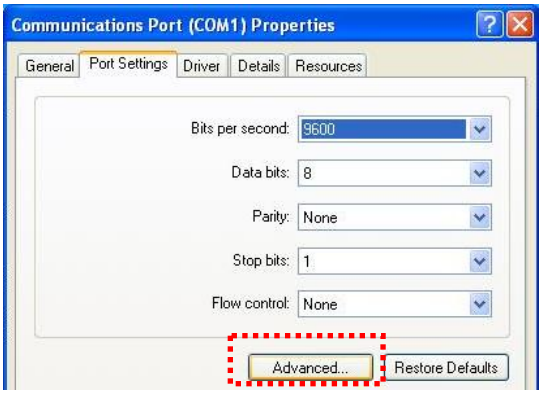
A new window will prompt out, showing the list of hardware which is available in your PC. User will need to expand the **Port (COM & LPT)** to locate the communication port. From the example below, the **USB to RS232 or Serial Port** is **COM3**. Please note that the communication port (COM) on each laptop will be different.

If the COM port is less than 10, **jump to step 6** and continue setting up the Smart Commander. If the COM port goes more than 10, kindly follow the next step to change the COM port number.

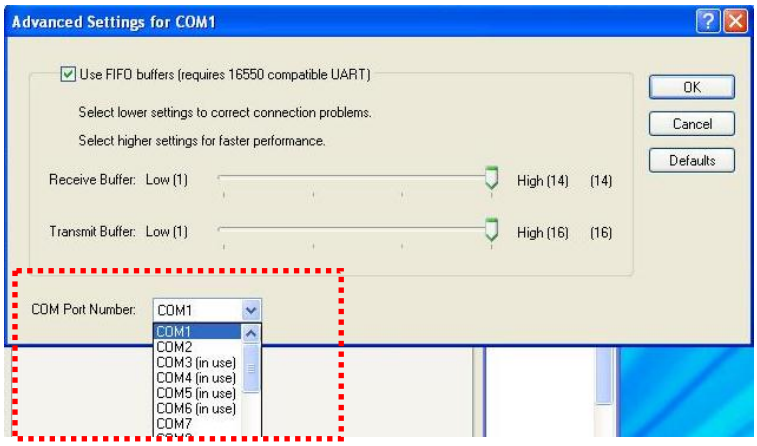


Step 5

Right click on the **USB to RS232 or Serial Port** and select **Properties**. Next, go to **Port Settings** and select **Advanced**.

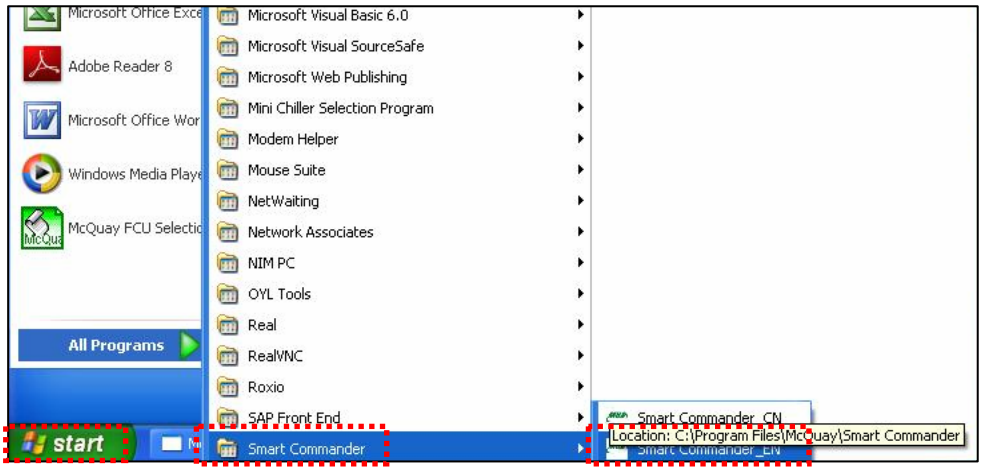


On the next window, you may change the **COM Port Number** to any number lower than 10. After the changes, click **OK** to save the setting.



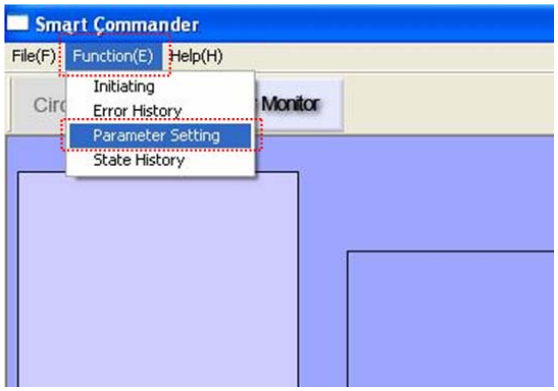
Step 6

Go to **Start**, **ALL Programs**, **Smart Commander**, **Smart Commander_EN** to launch the Smart Commander program. The path to execute the Smart Commander program may vary depends on the installation location and version of Smart Commander.



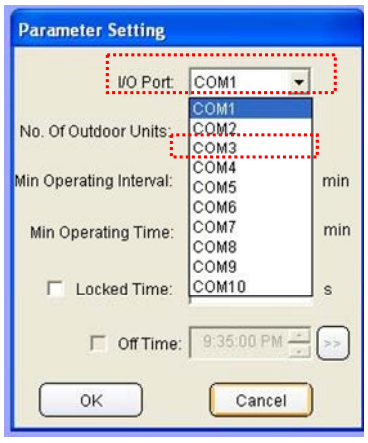
Step 7

Once the software is finished initiated, the user will need to set the COM port setting. To do this, please go to **Function(E)** and select **Parameter Setting**.



Step 8

A new window will prompt up for parameter setting. To change the communication port, go to **I/O Port** and click on the **down arrow**. Select the appropriate COM port number and click **OK**. Base on the previous example, the **USB to RS232 Serial Port** is **COM3.** Hence, "COM3" is selected. Please note that the communication port (COM) on each laptop will be different.

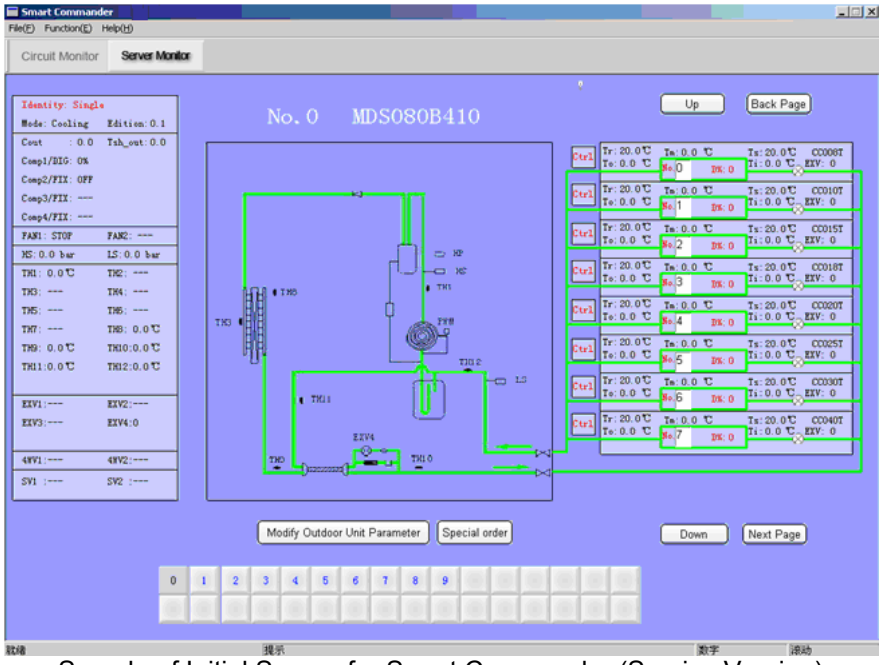


Step 9

After the setting of COM port is completed, the user can connect to the system. Go to drop down menu **Function (E)** again and select **Initiating** to connect to the MDS system.

4

Once the software is connected to the system, all available parameter of the system (Indoor and Outdoor) will be visible.



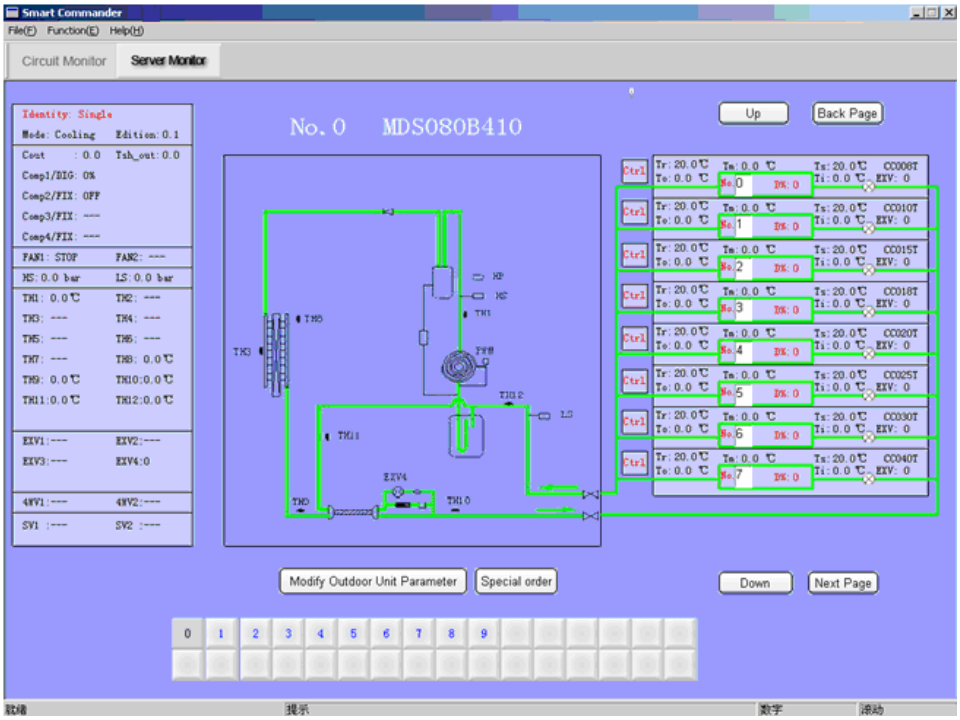
Sample of Initial Screen for Smart Commander (Service Version)

4.6 Smart Commander Software Interface

Smart Commander Service version has two different windows. The first window is named **Circuit Monitor**. User is allows to control and monitor the indoor and outdoor parameter under this windows. The **Server Monitor** window allows user to plot graph using the data already obtain when the Smart Commander is connected to the MDS system.

4.6.1 Circuit Monitor

Circuit monitor interface is used to monitor all parameter of indoor and outdoor which connected to Smart Commander.



Circuit Monitor Window in Smart Commander

If the MDS units are connected in a network, user can observe all parameter of outdoor unit through the outdoor set address in the PCB. Once the outdoor is selected, the relevant outdoor unit number will be highlighted with a darker color.

Control Panel for Outdoor Selection

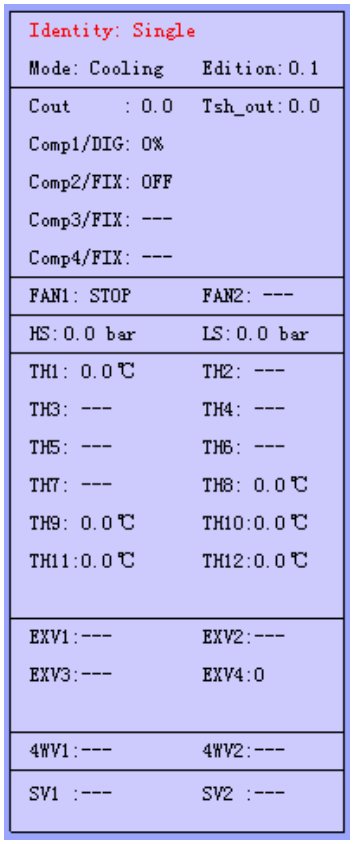
There are three major parts in the Circuit Monitor window.

i. Outdoor Unit Monitoring
ii. Outdoor Refrigerant Diagram
iii. Indoor Unit Control and Monitoring

The function and usage of these parts is shown in the following pages. Other than that, the Smart Commander (Service Version) software allows advance users to modify outdoor unit parameters. This function will be shown in the next section, 4.7 Software Additional Function.

i) Outdoor Unit Monitoring

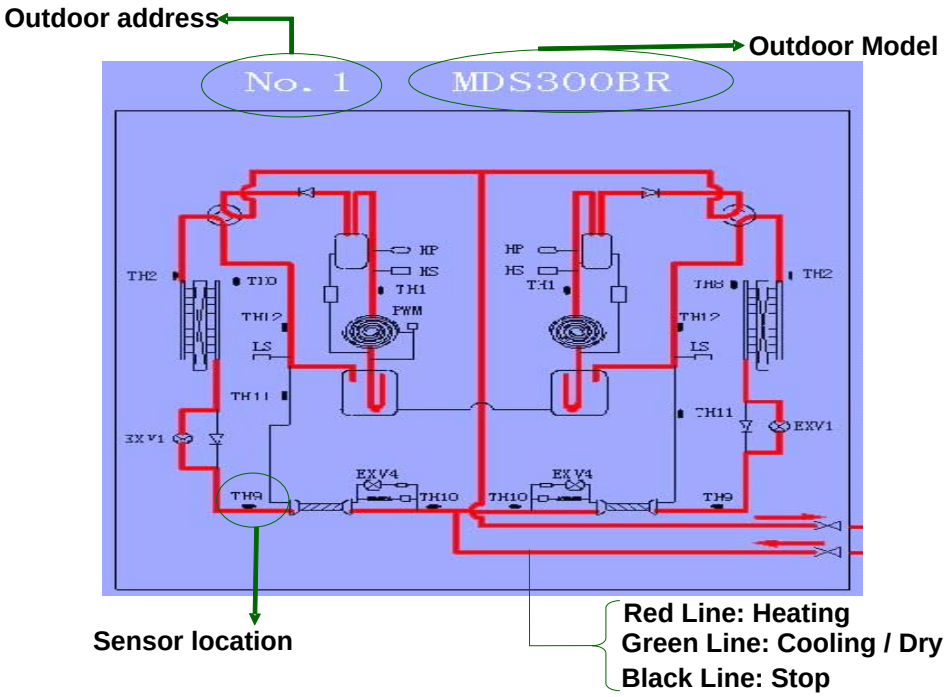
Items that can be monitor on an outdoor unit are as follow:



Item		**Display**
Identity	:	Type of model: Single / Master / Slave
Mode	:	Operating Mode: Cooling / Heating / Defrost
Edition	:	The program version of the outdoor
C_{out}	:	Outdoor Capacity (Unit: HP)
T_{sh_out}		Outdoor unit superheat (Unit: °C)
Comp1/DIG	:	Digital compressor output percentage (Unit: %)
Comp2/3/4/FIX	:	Fixed compressor status. ON / OFF
FAN1/FAN2	:	Outdoor fan status. STOP / LOW / HIGH
HS / LS	:	High pressure and low pressure reading (Unit: Bar, 1bar＝0.1MPa 1bar＝0.98kgf/cm^2)
TH	:	Temperature sensor reading. (Unit: °C) • TH1: Compressor discharge • TH2: Outdoor #1 condenser coil inlet • TH3: Outdoor #1 condenser coil midlet • TH4: Outdoor #2 condenser coil inlet • TH5: Outdoor #2 condenser coil midlet • TH8: Outdoor ambient temperature • TH9: Outdoor coil outlet temperature • TH10: Sub-cool outlet temperature • TH11: Sub-cool suction temperature • TH12: Outdoor return air temperature
EXV1/2/3	:	Electronic Expansion Valve Opening Steps. Fully close during cooling & defrost cycle. Only operate during heating cycle
EXV4	:	Sub-cool circuit Electronic Expansion Valve. Operate during cooling cycle. Fully close during heating cycle
SV1/2	:	By-pass valve. For future provision

Remark: If the model does not have the respective sensor, it will display "——" after the parameter item.

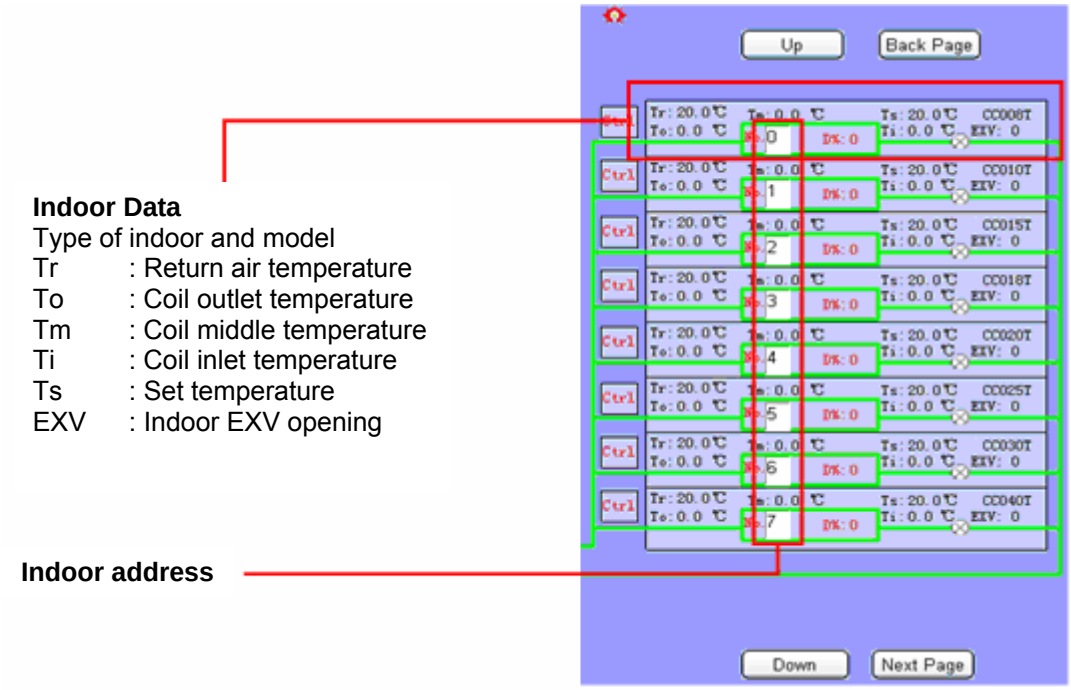
ii) Outdoor Refrigerant Diagram

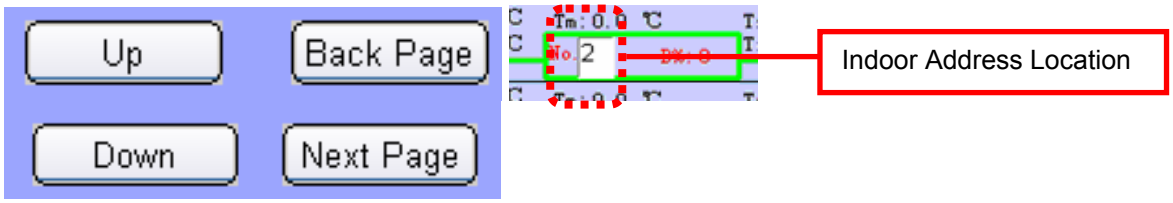


This allows the user to understand the refrigerant circuit within the outdoor unit. The different colors on the refrigerant line indicate the type of mode the outdoor unit is operating. It also shows the sensors location which helps if the user cannot remember the function of the sensor shows in the outdoor unit monitoring chart.

iii) Indoor Unit Control and Monitoring

When using the Smart Commander, the user can activate the indoors via the software. This allows troubleshooting to be carried out easily without the needs to go to the indoor unit to turn it on. Besides that, a list of information on the indoor model is also visible.

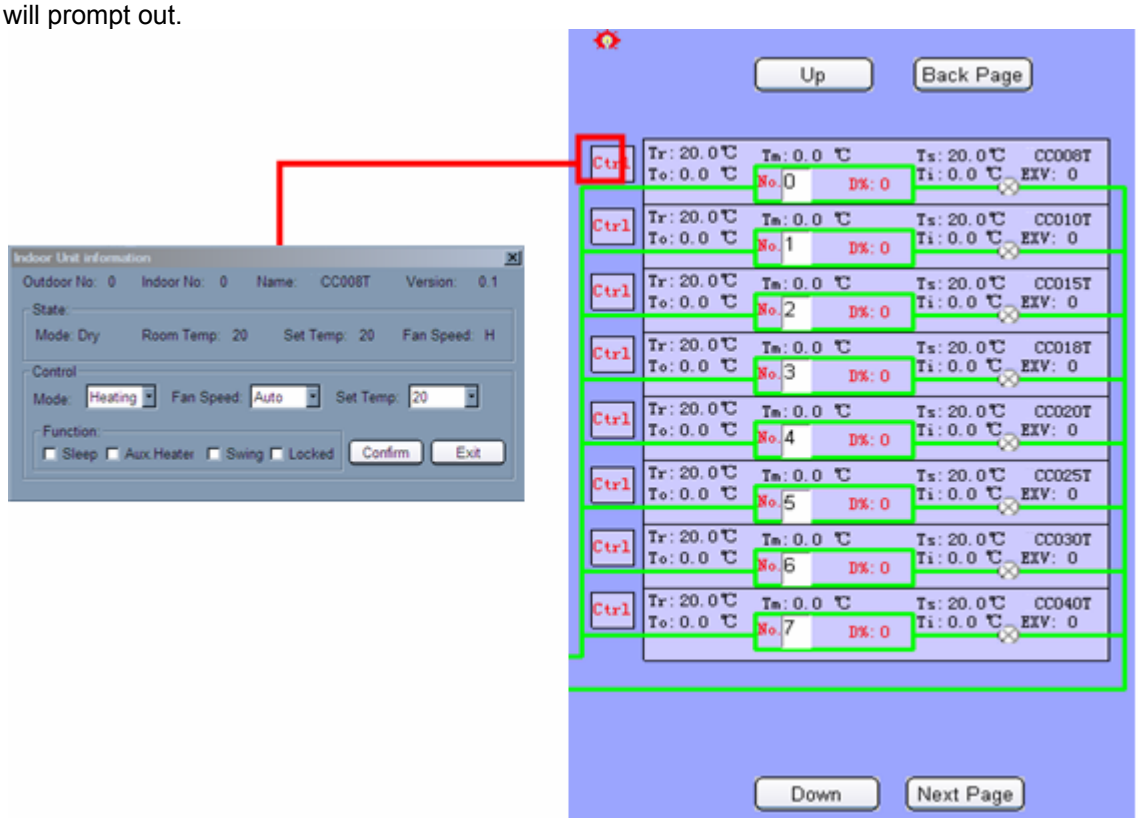




Take note that only 8 indoor units can be shown in the circuit monitor page. There are three ways to scroll to other unit if it is not shown in the screen:

- Click on the **Up** / **Down** button, the indoor unit will ascend or descend accordingly.
- Click on the **Back Page** or **Next Page** button, the whole set indoors will be change.
- Enter the indoor address number. This will directly display the indoor the user selected to view.

To change the setting on the indoor, user will need to click on the **Ctrl** button. After the button is clicked, a new window will prompt out.



The top part of the new prompt window displays the information of the indoor.

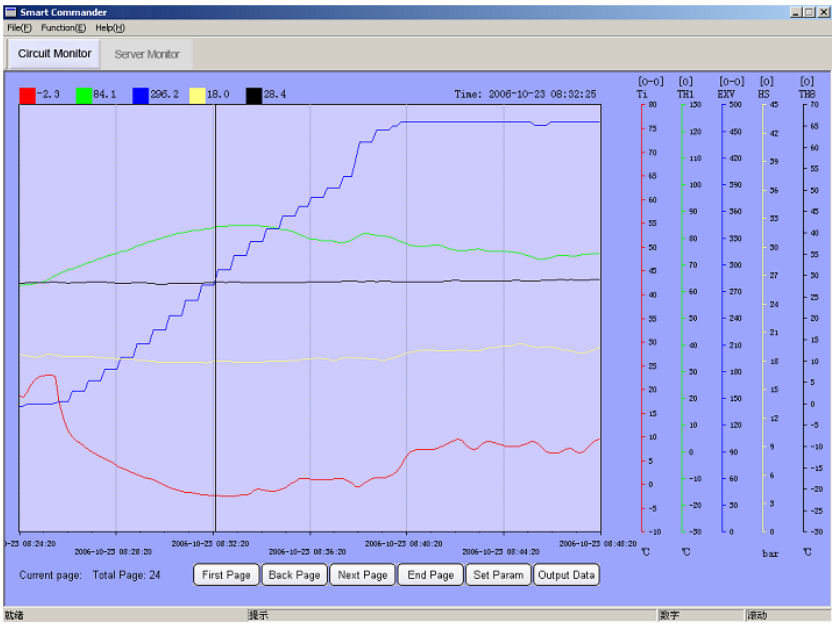
Outdoor No	:	The outdoor address this particular indoor is connected to. If there is no outdoor address set, the default value will be 0.
Indoor No	:	The address set on the indoor. This is based on the PCB setting.
Name	:	The indoor model and capacity.
Version	:	The Indoor PCB software version

In the **State** column, the current running mode, room temperature (°C), set temperature (°C) and fan speed for the indoor unit is displayed. These setting may be changed in the **Control** column.

Mode	:	Operating model of the indoor unit (Stop, Cooling, Heating, Dry, Fan)
Fan Speed	:	The operating fan speed. Available speed: High / Medium / Low / Auto
Set Temp	:	To set the required temperature of the indoor. (Unit: °C), range from 16 °C to 30 °C
Sleep Mode	:	Indoor unit to operate in sleep mode
Auxiliary Heater	:	To activate additional heater (if any)
Swing	:	Air swing. Not applicable for conceal / ducted model
Locked	:	To forbidden the usage of handset. Reset when the indoor power is turned off.

4.6.2 Service Monitor

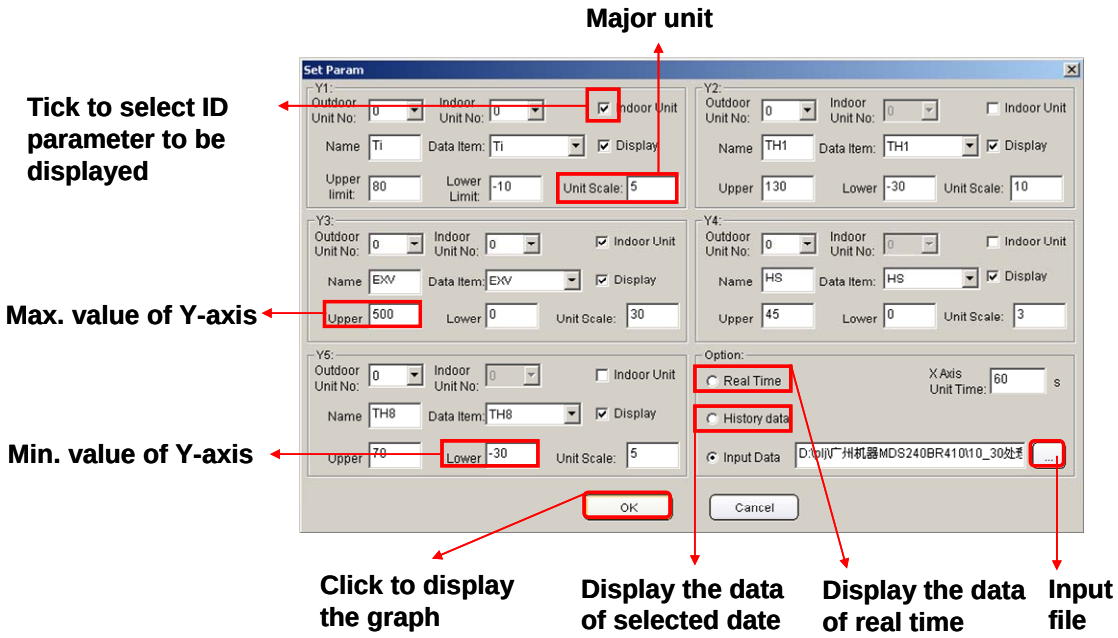
Service monitor interface is used to plot graph by using the MDS system parameter. By viewing the graph, it will provide observation on the system operation condition. Total 5 parameters (outdoor or indoors) can be selected.



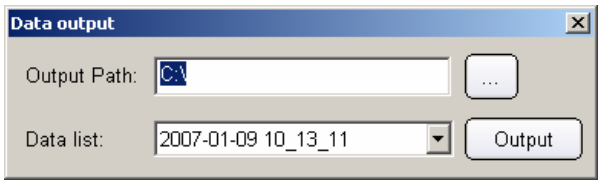
Service Monitor Window in Smart Commander

There are 6 function buttons at the bottom of Service Monitor screen. The function of the buttons is as follow:

- **First page** : Proceed to the first page of the graph
- **Back page** : Proceed to the previous page of the graph
- **Next page** : Proceed to next page of the graph
- **End page** : Proceed to the last page or the graph
- **Set Param** : A new window will prompt out allowing user to determine which parameter to plot.



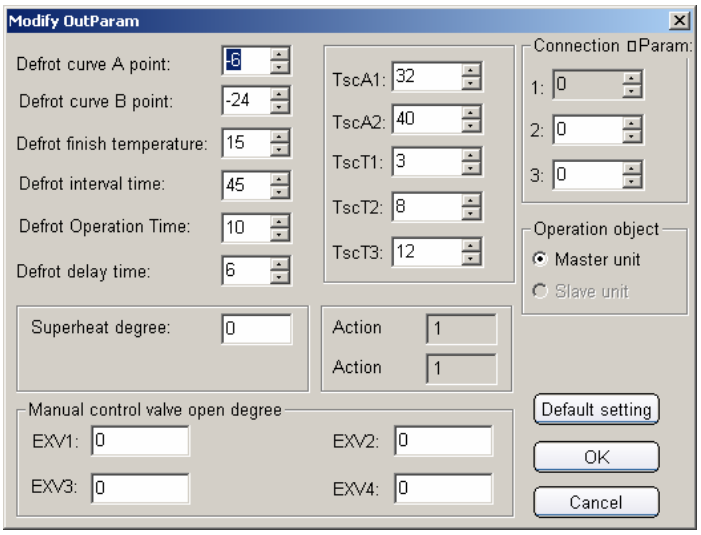
- **Output Data**: A new window will prompt out allowing user to save the data (in excel sheet) to personal PC.



4.6.3 Additional Function

Unit setting may be modified by clicking **Modify Outdoor Unit Parameter** under **Circuit Monitor** screen. It is advisable **not to change any data** unless under the instruction from the factory side. The default value set had been decided after numerous testing conducted by R&D and should be suitable for most condition.

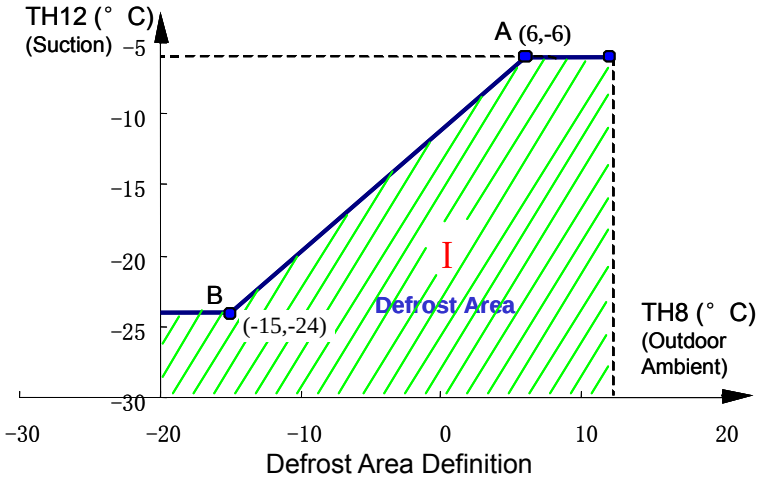
A new window will prompt out when the user click on the **Modify Outdoor Unit Parameter** button in circuit monitor page.



- **Defrost curve A, B point**: It is used to define defrost area. For the defrost curve A point, the outdoor ambient is set at 6°C. User is only allowed to change the suction temperature. The allowable range is from -2°C to -15°C (Default value is -6°C).

- **Defrost curve B point**: The outdoor ambient is set at -15°C. User is only allowed to change the suction temperature. The allowable range is from -30°C to -15°C (Default value is -24°C).

Note: If the value is smaller, the defrost area (shaded area I) will become smaller. This means that it is harder for the system to enter the defrost cycle. After the system had enter the defrost cycle, the system will terminate the defrost cycle faster.



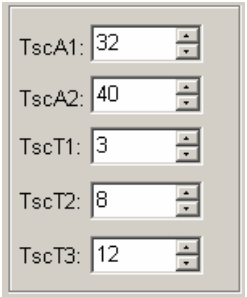
- **Defrost Finish Temperature**: The defrost cycle will stop once TH9 exceed this set point. The lower the temperature, the faster the defrost cycle will end. The allowable range is from 10°C to 50°C (Default value for (5)MDS80-240B/BR is 15°C for (5)MDS260-500B/BR is 18°C).

- **Defrost Interval Time**: The interval time between defrost cycle. The smaller the value, the shorter time between the defrost cycle. The allowable range is from 25 minutes to 90 minutes. Default value is 45 minutes.

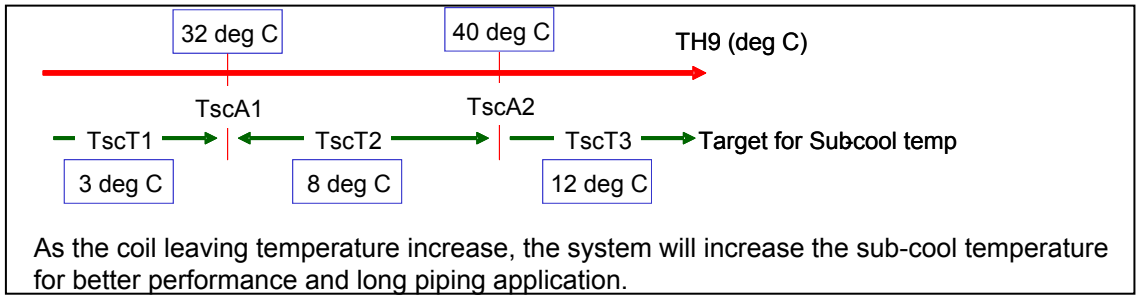
- **Defrost Operation Time**: The duration of the defrost cycle. The smaller the value, the short the defrost duration. The allowable range is from 5 minutes to 15 minutes. Default value is 10 minutes.

- **Defrost Delay Time**: This option is for future provision. Currently is not available.

- **Sub-cool Circuit Parameter**: The next parameter is TscA1, TscA2, TscT1, TscT2, TscT3 which located inside a same box. These 5 setting is use to change the sub-cool circuit, which is only available in the MDS-B series outdoor ((5)MDS 80-500 B/BR).



The main mechanism controlling the sub-cool circuit is the EXV 4. TscA1 & TscA2 is the reference temperature for TH9, which is the refrigerant temperature before sub-cool circuit. TscT1, TscT2 & TscT3 is the Sub-cool target temperature the system needs to achieve. The actual sub-cool temperature will be based on TH9-TH10.

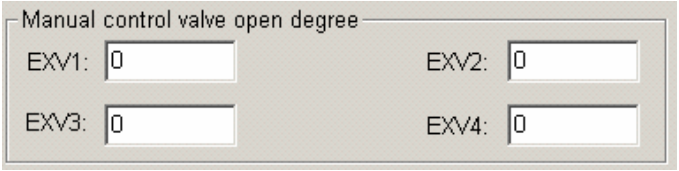


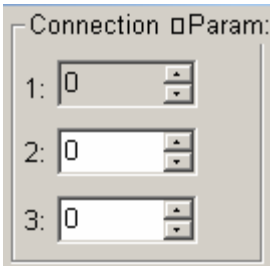
Example of Sub-Cool Circuit Control (with default value)

- **Superheat degree**: This is the parameter for controlling outdoor superheat (EXV 1). This option is only applicable for heatpump model and EXV 1 is only used during heating cycle. The EXV 1 will open to achieve the target set here. Default value will be 5°C for R22 and 3°C for R410A model.

Outdoor super heat (Tsh) = T12 (Suction Temp) – Te (Saturation temperature)

- **EXV1, EXV2, EXV3 and EXV4**: This is to manually control the opening of the EXV. It is only applicable for MDS-B series outdoor ((5)MDS 80-500 B/BR). EXV1/2/3 is only use during heating cycle. It remains shut during cooling or defrosts cycle. These EXV will not be available in cooling only model. EXV 4 is only use during cooling cycle and remains shut during heating cycle.



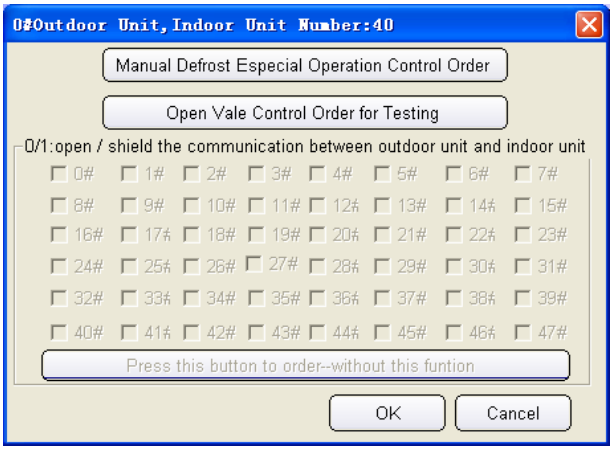


- **Connection Param 1**: Not applicable (for future provision).

- **Connection Param 2**: Refers to compensation for long piping application. Default setting is 10 (Setting range from 10 to 50). It is used to increase capacity of outdoor during low load condition (only a few indoors are turned ON). For example, when it is set to 15, indoor capacity will be multiply by 1.5 times. When the piping is long, the outdoor will increase the output capacity to match the losses along the piping to ensure the indoor received the sufficient capacity.

- **Connection Param 3**: Compensation for heating cycle. Default value is 37ºC. If indoor coil middle temperature is too low, outdoor will increase capacity to achieve the set value.

Beside the **Modify Outdoor Unit Parameter**, there is another button called **Special Order**. Once the button is selected, a new window will prompt.



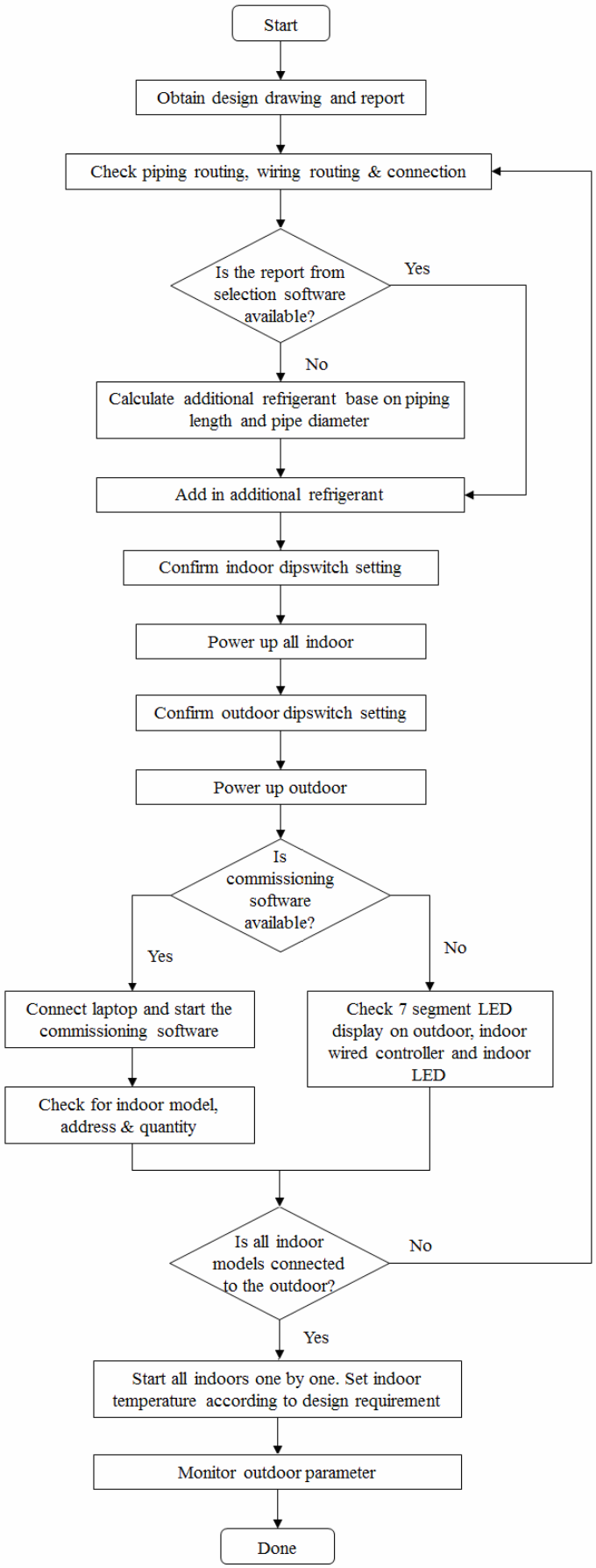
- **Manual defrost special operation control order**: Only applicable for heatpump model and can be activated during heating cycle. Once the button is selected, the outdoor will automatically go into defrost cycle. The duration for the defrost cycle will be 10 minutes.

- **Open valve control order when testing**: Useful during commissioning. Once this button is selected, all EXV will fully open (480 steps). This function is only valid for MDS-B series ((5)MDS 80-500 B/BR). To resume normal operation, just press on the reset button located on the MDS-M PCB.

Location of Reset button for MDS-M PCB

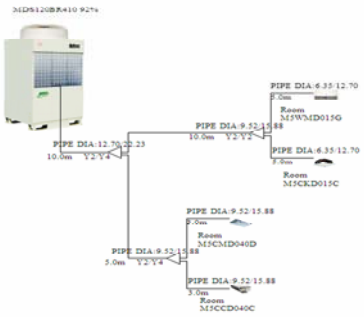
5.0 Commissioning

In order to commission MDS, there are some necessary steps to follow. These steps help to streamline the possible problem that may occur during commissioning. The flow chart below provides a general guide line for commissioning MDS system. This is useful whether for first timer as reference or experience technicians / engineers as check list.



5.1 Obtain Design Drawing and Report

During the design of MDS system by using the selection software, the user will draw the equipment layout on the software workplace. After completed the drawing, the software will select the appropriate outdoor model base on the user requirement. Once all this is completed, user will be able to generate the report. The system layout and report is necessary in order to have a smooth running commissioning process.



Outdoor Model

System Name	A	B	C	D	E	F(kW)	G(W/m^2)	H(W)
df	letto 1	63	Dining Room	0	M5CKD10C	2.8/3.2	44/51	16
MDS080BR410 (25.0/28.0kw)	letto 1	1	Dining Room	0	M5WMD10G	2.8/3.2	2800/3200	26
Actual capacity ratio 63%/64%	letto 1	1	Dining Room	0	M5WMD09G	2.5/2.8	2500/2800	24
Input Power:7.2 kW	letto 1	63	Dining Room	0	M5CMD15E	3.6/4.0	57/63	79
Voltage:380V/3N^/50Hz	letto 1	1	Dining Room	0	M5CMD15E	3.6/4.0	3600/4000	79
Positive height difference: -5.0m	Subtotal	129	---	---	---	15.3/17.2	---	224.0
The maximum pipe length: 33.0m	CopperPipe	6.35mmxt0.8	17.3	9.52mmxt0.8	39.0	12.7mmxt1.0	3.3	---
Charge refrigerant:2529 g	CopperPipe	15.88mmxt1.2	12.0	19.05mmxt1.2	0.0	22.23mmxt1.2	13.0	---
Indoor cooling condition:DB27.0/WB19.0	CopperPipe	28.6mmxt1.2	0.0	31.75mmxt1.4	0.0	34.9mmx1.4t	0.0	---
Indoor heating condition:DB20.0/WB15.0	CopperPipe	38.1mmxt1.6	0.0	41.3mmxt1.6	0.0	22.2mmxt1.2	0.0	---
---	Refnet	MDS-Y1-A	0	MDS-Y2-A	5	MDS-Y3-A	2	---
---	Refnet	MDS-Y4-A	1	MDS-Y6	0	MDS-Y7	0	---
---	Refnet	MDS-C1	0	MDS-C2	0	---	---	---

Extra refrigerant charge

Indoor Model

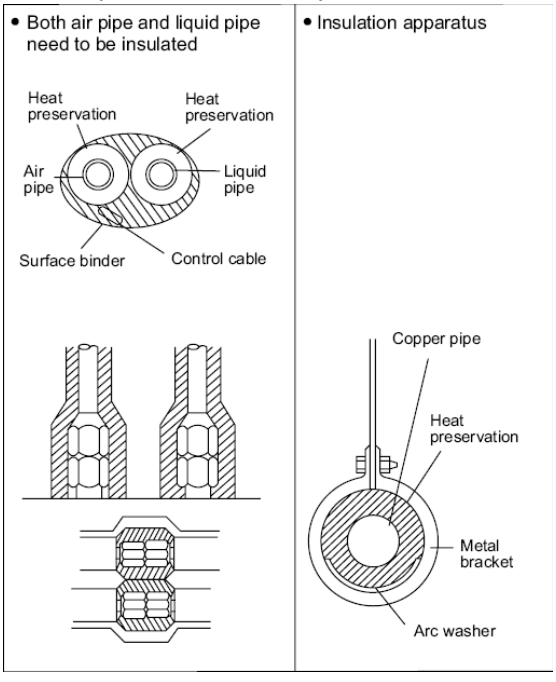
5.2 Check Piping Routing, Wiring Routing & Connection

After obtaining the design drawing and report, we will need to check on the piping and wiring connection. Although this should be done during installation, it is better to check all items again before commissioning.

Piping Routing

Ensure both liquid and gas pipe are insulated according to the specification stated below. For hot and wet environment, it is recommended to increase the insulation thickness. If there is special request due to customer requirement or country regulation, please follow the specification stated.

	Pipe Specifications	
Diameter (mm)	6.25 to 25.4	28.58 to 41.3
Thickness	At least 10mm	At least 12mm
Heat insulation	At least 100ºC	



EXV Box

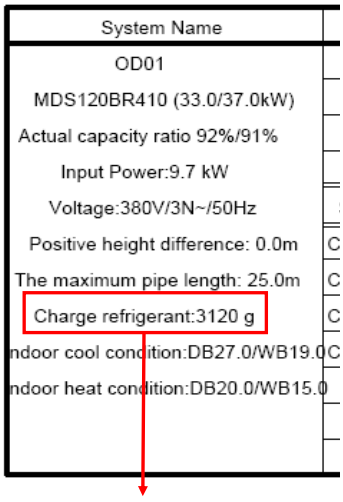
Ensure that the orientation of the EXV box is in vertical condition.

5.3 Add in additional refrigerant

Even though the MDS outdoor unit is pre-charged with refrigerant from the factory, but additional refrigerant is still required. This is because the pre-charge of refrigerant from the factory may not be sufficient to ensure the whole system to work according to design condition due to different piping length. There are two ways to obtain the additional refrigerant required. It can be obtain from the report generated by selection software or through manual calculation. Whichever method user used to determine the additional refrigerant, it is recommended to monitor the parameter of the outdoor model to ensure that the unit is working properly. The calculation done is only served as a guideline.

Report from Selection Software

After using the Selection Software to choose the appropriate model and piping layout, user is allowed to generate the information into a report. From the report itself, the proposed additional amount of refrigerant required are stated in the report.



Additional charge required

Manual calculation

To use this method, the user is required to get the whole piping schematic diagram. After that, user will need to know the exact pipe length and their respective diameter. Then, user will need to sum up the piping length used on the liquid pipe only base on different diameter. Once the piping length of different diameter is obtained, apply the length into the formula below to calculate additional refrigerant required.

Additional charge amount:
= ∑ Li* Gi

Example
= (Piping Length for 15.88mm X Additional Charge Amount)
+ (Piping Length for 12.7mm X Additional Charge Amount)
+ (Piping Length for 9.52mm X Additional Charge Amount)
+ (Piping Length for 6.35mm X Additional Charge Amount)

Caution that, the additional charge amount of different pipe diameter varies base on type of refrigerant.

Pipe Diamater (mm)	6.35	9.52	12.70	15.88	19.05
R22 Additional Charge (g/m)	50	80	120	180	290

Pipe Diamater (mm)	6.35	9.52	12.70	15.88	19.05
R41A additional Charge (g/m)	45	70	120	180	260

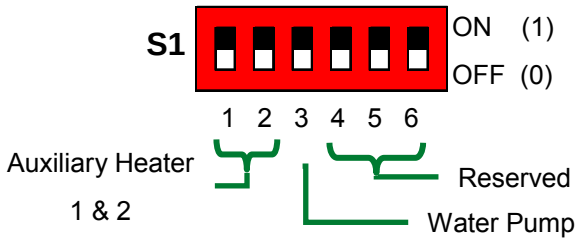
5.4 Confirm Indoor Dipswitch Setting

For MDS system, every unit is assigned with an address for communication and signal transmission purpose. Both indoor and outdoor unit address need to be set manually through the dipswitch located on the PCB. Other than address, other setting such as unit model and capacity are also set through the dipswitch. These settings can be done during the installation process or before commissioning. It is advisable to check the settings before commissioning starts.

The dipswitch location is different for indoor PCB MC200-C and MC201-C (Please refer to page 16 and 17). Even though there are two types of indoor PCB, the dipswitch function is the same. For MDS indoor, there are 4 types of setting need to be determined:

a) Indoor Type
b) Indoor Capacity
c) Indoor Address
d) Indoor Function

Dipswitch 1 (SW1)



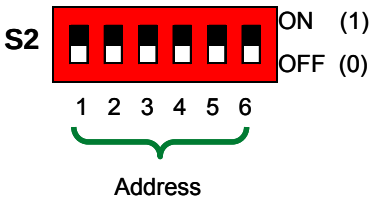
Dipswitch 1 (SW1) is to determine the special function of the indoor unit. There are 2 main special functions that can be specified in MDS indoor unit. The first function is the heater function. This heater option is only applicable for ducted model (using wired controller) and it will function during heating cycle or fan mode.

Locating the dipswitch S1.1 and S1.2 to ON position will give the PCB ability to control the heater relay. The PCB is allowed to connect to 2 heaters. If only 1 heater is available, just locate S1.1 to ON position. If 2 heaters are used, both S1.1 and S1.2 need to be located to ON position.
The control algorithm of the heaters is shown in page 12.

For dipswitch S1.3 (Water Pump), it will be set to ON position for all ceiling cassette unit. The drain pump will operate when the indoor unit is turned ON. The water pump will stop operation if the water level sensor is in OPEN condition.

For dipswitch S1.4 until S1.6, currently is reserve for future used.

Dipswitch 2 (SW2)



Dipswitch 2 is for address setting. Each indoor unit within the same outdoor unit must have different address. The table below shows the indoor address setting.

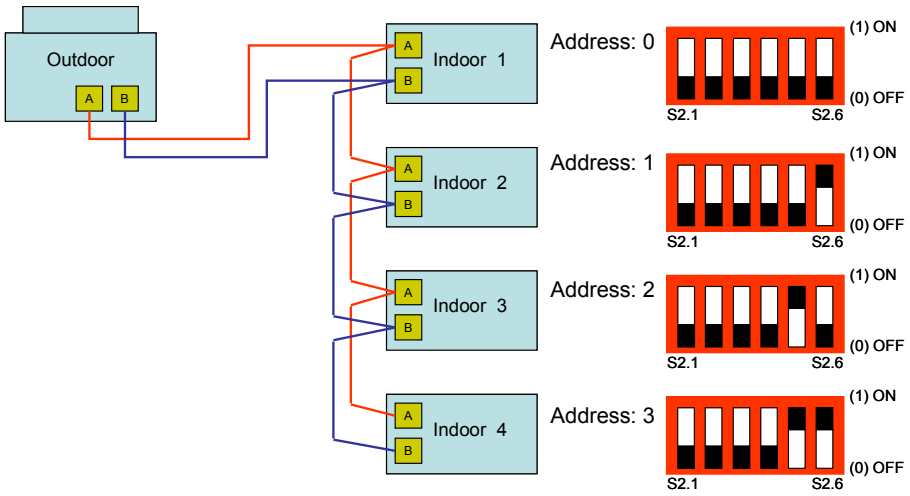
S2.1	S2.2	S2.3	S2.4	S2.5	S2.6	Indoor Address
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
0	0	0	1	0	0	4
0	0	0	1	0	1	5
0	0	0	1	1	0	6
0	0	0	1	1	1	7
0	0	1	0	0	0	8
0	0	1	0	0	1	9
0	0	1	0	1	0	10
0	0	1	0	1	1	11
0	0	1	1	0	0	12
0	0	1	1	0	1	13
0	0	1	1	1	0	14
0	0	1	1	1	1	15
0	1	0	0	0	0	16
0	1	0	0	0	1	17
0	1	0	0	1	0	18
0	1	0	0	1	1	19
0	1	0	1	0	0	20
0	1	0	1	0	1	21
0	1	0	1	1	0	22
0	1	0	1	1	1	23

S2.1	S2.2	S2.3	S2.4	S2.5	S2.6	Indoor Address
0	1	1	0	0	0	24
0	1	1	0	0	1	25
0	1	1	0	1	0	26
0	1	1	0	1	1	27
0	1	1	1	0	0	28
0	1	1	1	0	1	29
0	1	1	1	1	0	30
0	1	1	1	1	1	31
1	0	0	0	0	0	32
1	0	0	0	0	1	33
1	0	0	0	1	0	34
1	0	0	0	1	1	35
1	0	0	1	0	0	36
1	0	0	1	0	1	37
1	0	0	1	1	0	38
1	0	0	1	1	1	39
1	0	1	0	0	0	40
1	0	1	0	0	1	41
1	0	1	0	1	0	42
1	0	1	0	1	1	43
1	0	1	1	0	0	44
1	0	1	1	0	1	45
1	0	1	1	1	0	46
1	0	1	1	1	1	47

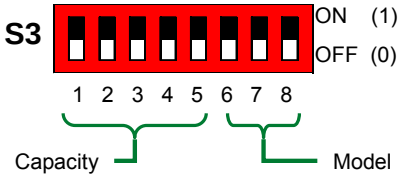
While setting the indoor address, there are a few rules need to follow. The rules are as follow:

a) Each indoor address must be unique and it must not duplicate within a system.
b) The first indoor address must be 0. Do not start the first indoor with address 1.
c) While setting the indoor address, the indoor address number cannot skip. For example, if there are only 4 indoors in a system, the indoor address needs to be 0, 1, 2 and 3.
d) It is advisable that the indoor address follows the sequence of the communication wiring. For example, for a 4 indoors in the system, the first indoor after the outdoor should have address 0, the next indoor address should be 1 and the last indoor of the communication wiring should be 3.

Example:



Dipswitch 3 (SW3)



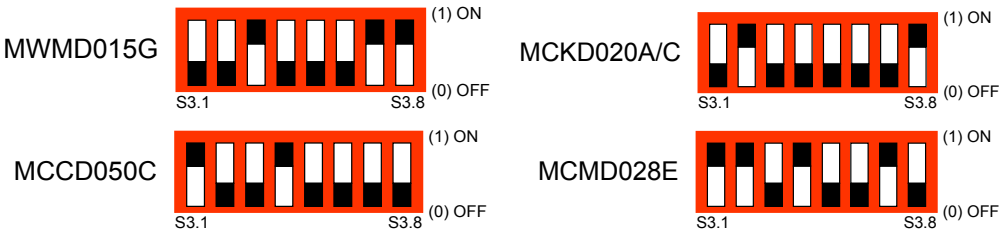
Dipswitch 3 is for model and capacity setting. It is advisable that the commissioner to check all the indoors during every commissioning. The tables below show the respective setting for indoor type and indoor capacity.

S3.1	S3.2	S3.3	S3.4	S3.5	Capacity (kW)	Model Name
0	0	0	1	0	2.5	09
1	0	1	1	0	2.8	10
0	0	1	0	0	3.6	15
0	1	0	0	0	5.6	20
0	1	0	1	0	6.5	25
1	1	0	1	0	8.0	28
1	1	1	0	0	9.0	30
0	1	1	1	0	10.0	38
1	1	1	1	0	11.2	40
1	0	0	1	0	14.0	50
0	1	0	1	1	16.4	60/62
0	0	0	0	1	22.4	80
0	0	0	1	1	28.0	100

Model name:
Applicable for Wall Mounted, Ceiling Concealed, Ceiling Cassette and Ceiling Convertible

S3.6	S3.7	S3.8	Indoor Type
0	0	0	Ceiling Concealed
0	0	1	Ceiling Cassette
0	1	0	Ceiling Convertible
0	1	1	Wall Mounted
1	0	0	Ducted Blower

Example:



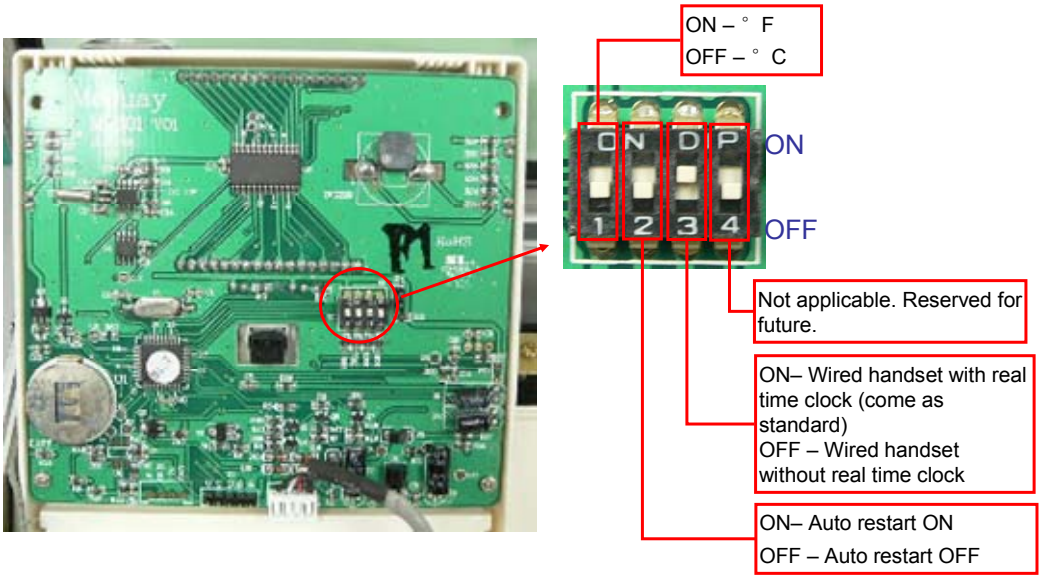
Dipswitch 4 (SW4)

Dipswitch 4 is reserved for software upgrade purpose. This dipswitch shall remain OFF all the time.

5.5 Power Up All Indoor

After the dipswitch setting for all indoor unit is done, power up all indoors to detect any indoor which is not supplied with electricity. If user wishes to have auto-random restart function in their indoor units, we can activate it during this time. The standard indoor comes with auto-random restart disabled. There are two types of setting to activate the auto random restart function. For ceiling concealed model which is using the wired controller (MC301), the setting is done on the handset PCB itself. For wireless handset model (wall mounted, ceiling cassette and ceiling convertible), the setting can be done using the wireless handset.

Auto-Random Restart for Wired Controller (MC301)



For wired handset (MC301), there are 4 dipswitches on the back of the PCB. Once the auto-random restart is set, the LCD of the wired controller will have an indication.

Remark: While changing the setting, please make sure the power supply of the indoor is switch off. This dipswitch setting is not applicable for Central Controller MC303.

Auto-Random Restart for Wireless Controller

To enable auto random restart function on indoor unit using wireless handset, the process will be slightly complicated. The indoor power supply must be available.

To enable Auto Random Restart, the steps are as follow:

1. Press the indoor PCB emergency ON/OFF button for 5 seconds to go into setting mode. When the unit are in setting mode, all the LED of the indoor will be light up.
2. Use the wireless handset, select “Fan” mode.
3. Select “High Fan” speed.
4. Press the “ON/OFF” button on the wireless handset to complete the setting. Once the setting is complete, all the indoor LED will be turned off and the unit will remain in standby mode.

To disable Auto Random Restart, the steps are as follow:

1. Press the indoor PCB emergency ON/OFF button for 5 seconds to go into setting mode. When the unit are in setting mode, all the LED of the indoor will be light up
2. Use the wireless handset, select “Fan” mode.
3. Select “Medium Fan” speed
4. Press the “ON/OFF” button on the wireless handset to complete the setting. Once the setting is complete, all the indoor LED will be turned off and the unit will remain in standby mode.

Remark: After entering the setting mode (all indoor LED is ON), if there is no operating for 60 seconds, it will automatically exit from setting mode

5.6 Confirm Outdoor Dipswitch Setting

Similar to indoor, there are also some settings need to be done for outdoor unit. The unit capacity and model type are usually set before ship out from the factory. However, it is advisable to check on the dipswitch again before power up the outdoor. As for the outdoor address, it is only required when there is a series of outdoors connected and control by the central control and monitoring software.

For outdoor model, there are two type of outdoor board:

- MDOM PCB – For MDS-A series and 5MDS 50/60/70 B/BR
- MDS-M PCB – (5)MDS 80-500 B/BR

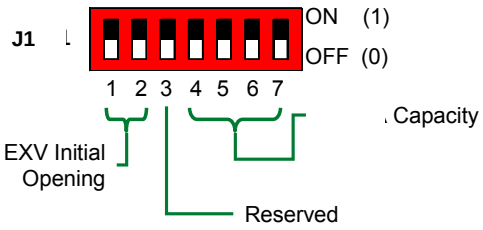
5.6.1 Setting Up MDOM PCB

Basically, setting up MDOM PCB requires 3 steps:

1. Set up dipswitch 1 (J1)
2. Set up dipswitch 2 (J2)
3. Set up indoor quantity (K2 and K1 button)

Set up Dipswitch 1 (J1)

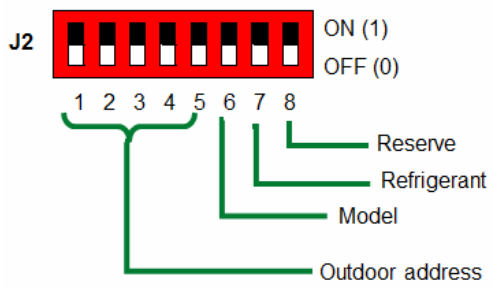
For outdoor unit which runs on MDOM PCB, there are 2 set of dipswitches (J1 and J2). Besides this, there is also a setting mode to modify certain important parameters (K2 and K1 button). Please refer to page 14 for further description on their location.



For dipswitch 1 (J1), the main function is to determine the outdoor capacity. Dipswitch J1.1 and J1.2 (EXV Initial Opening) is only use by R&D for testing purpose. During site commissioning, it is advisable not to alter the setting unless advice by factory side. Dipswitch J1.3 is reserved for future used. Dipswitch J1.4 to J1.7 is to determine the outdoor unit capacity.

J1.4	J1.5	J1.6	J1.7	Capacity
0	1	0	1	3HP
0	0	0	0	4HP
0	0	0	1	5HP
0	0	1	0	6HP
0	1	1	0	7HP

Set up Dipswitch 2 (J2)



For dipswitch 2, there are 2 main functions. The first will be the type of model (J2.6) and the second will be the outdoor address setting (J2.1 to J2.5). Dipswitch J2.7 is for refrigerant type and J2.8 is reserved for future provision.

For dipswitches J2.6, model selection, it will determine whether the model is a cooling only model or a heatpump model. The reason of the needs of this selection is because the PCB is common for both cooling only model and heatpump model. To select a cooling only model, position dipswitch J2.6 to ON position and for heatpump model, position it to OFF position.

J2.6	MODEL	J2.7	Refrigerant
0	Heatpump	0	R-22
1	Cooling only	1	R-410A

If the outdoor is not connected to the central control monitoring software (Smart Commander) or the Central Wired Controller (MC303), there is no need to set the address (address remain as 0). If the outdoor is connected with these accessories, then the same rules on the indoor setting apply here. The rules are as follow:

a) Each outdoor number must be unique. The outdoor address cannot duplicate.
b) The first outdoor address must be 0. Do not start the first outdoor with address 1.
c) While setting the outdoor address, the outdoor address number cannot skip. For example, if there are only 4 outdoors in a system, the outdoor address needs to be 0, 1, 2 and 3.
d) It is advisable that the outdoor address follow the sequence of the communication wiring. For example, for a 4 outdoors in the system, the first outdoor after the MC501 gateway should have address 0, the next outdoor address should be 1 and the last outdoor of the communication wiring should be 3.

J2.1	J2.2	J2.3	J2.4	J2.5	Outdoor Address	J2.1	J2.2	J2.3	J2.4	J2.5	Outdoor Address
0	0	0	0	0	0	0	0	0	0	1	16
1	0	0	0	0	1	1	0	0	0	1	17
0	1	0	0	0	2	0	1	0	0	1	18
1	1	0	0	0	3	1	1	0	0	1	19
0	0	1	0	0	4	0	0	1	0	1	20
1	0	1	0	0	5	1	0	1	0	1	21
0	1	1	0	0	6	0	1	1	0	1	22
1	1	1	0	0	7	1	1	1	0	1	23
0	0	0	1	0	8	0	0	0	1	1	24
1	0	0	1	0	9	1	0	0	1	1	25
0	1	0	1	0	10	0	1	0	1	1	26
1	1	0	1	0	11	1	1	0	1	1	27
0	0	1	1	0	12	0	0	1	1	1	28
1	0	1	1	0	13	1	0	1	1	1	29
0	1	1	1	0	14	0	1	1	1	1	30
1	1	1	1	0	15	1	1	1	1	1	31

Set up Indoor Quantity

To set up indoor quantity, you will need to utilize the K2 and K1 button (refer to page 14) and follow the procedure below:

1. Power up the outdoor.
2. Press K2 for 5 second to enter parameter setting mode. The 7 segments LED display will show [- - - -].
3. You need to key in the password before you can make any changes. The password is 0755
4. Press K1 to select. Press K2 to confirm.
5. After it show [- - - -], press K1. It will show [- - - 0]. Press K2, it will show [- - 0-].
6. After that, press K1 to select “7” and K2 to confirm.
7. Once you successfully select “0755” and press K2, the PCB will enter to setting mode.
8. The available setting to adjust are as follow:
   a. Indoor Quantity
   b. Temperature to initiate defrost checking
   c. Temperature to initiate defrost cycle
   d. Temperature to stop defrost cycle
   e. Interval of defrost cycle
   f. Duration of defrost cycle

   Most of the time, the only setting that need to do is the indoor quantity. Other data remain as factory default value.
9. If there is only 4 indoors in the system, please select “4” by pressing K1 until the LED show 4. Then press K2 to confirm.
10. Leave it for 5 seconds and the system will come out from the setting mode automatically.

Remark: Please read first before you try on the PCB. If K1 or K2 is not press after 5 seconds, it will exit from the setting mode automatically.

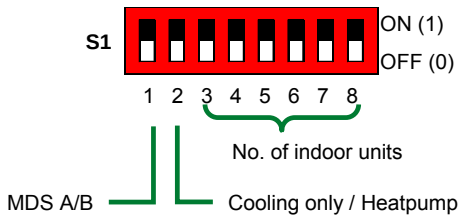
5.6.2 Setting Up MDS-M PCB

Setting up MDS-M PCB is simpler and requires 3 steps as well:

1. Set up dipswitch 1 (S1)
2. Set up dipswitch 2 (S2)
3. Set up dipswitch 3 (S3)

Please refer to page 15 for the location of the dipswitches.

Set up Dipswitch 1 (S1)



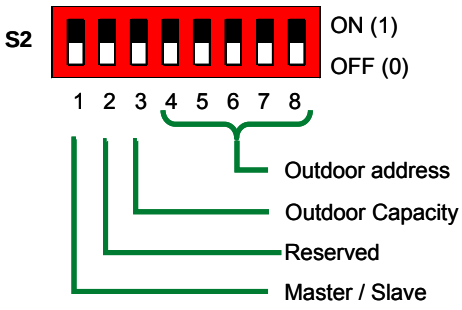
For dipswitch 1, there are 3 functions. S1.1 is to determine whether the PCB is use in the MDS-A series or a MDS-B series. S1.2 is to determine whether the model is a cooling only model or heatpump model. Dipswitch S1.3-S1.8 are used to determine the quantity of indoors connected to the outdoor.

S1.1	MODEL	S1.2	MODEL
0	MDS-B Series	0	Heatpump
1	MDS-A Series	1	Cooling only

S1.3	S1.4	S1.5	S1.6	S1.7	S1.8	Indoor Quantity
0	0	0	0	0	0	1
0	0	0	0	0	1	2
0	0	0	0	1	0	3
0	0	0	0	1	1	4
0	0	0	1	0	0	5
0	0	0	1	0	1	6
0	0	0	1	1	0	7
0	0	0	1	1	1	8
0	0	1	0	0	0	9
0	0	1	0	0	1	10
0	0	1	0	1	0	11
0	0	1	0	1	1	12
0	0	1	1	0	0	13
0	0	1	1	0	1	14
0	0	1	1	1	0	15
0	0	1	1	1	1	16
0	1	0	0	0	0	17
0	1	0	0	0	1	18
0	1	0	0	1	0	19
0	1	0	0	1	1	20
0	1	0	1	0	0	21
0	1	0	1	0	1	22
0	1	0	1	1	0	23
0	1	0	1	1	1	24

S1.3	S1.4	S1.5	S1.6	S1.7	S1.8	Indoor Quantity
0	1	1	0	0	0	25
0	1	1	0	0	1	26
0	1	1	0	1	0	27
0	1	1	0	1	1	28
0	1	1	1	0	0	29
0	1	1	1	0	1	30
0	1	1	1	1	0	31
0	1	1	1	1	1	32
1	0	0	0	0	0	33
1	0	0	0	0	1	34
1	0	0	0	1	0	35
1	0	0	0	1	1	36
1	0	0	1	0	0	37
1	0	0	1	0	1	38
1	0	0	1	1	0	39
1	0	0	1	1	1	40
1	0	1	0	0	0	41
1	0	1	0	0	1	42
1	0	1	0	1	0	43
1	0	1	0	1	1	44
1	0	1	1	0	0	45
1	0	1	1	0	1	46
1	0	1	1	1	0	47
1	0	1	1	1	1	48

Set up Dipswitch 2 (S2)



For Dipswitch 2, the main function is to set the outdoor address if the outdoor is connected in a network of outdoors or Central Wired Controller (MC303). Dipswitch S2.1 is to determine whether the outdoor is a single unit, master unit or salve unit. Dipswitch S2.3 is related to Dipswitch S3 which is used to determine the capacity of the outdoor. This will be cover in dipswitch S3.

S2.1	Type of Model
0	Slave Module
1	Single/Master Module

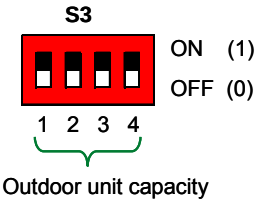
If the outdoor is not connected to the central control monitoring software (Smart Commander) or the Central Wired Controller (MC303), there is no need to set the address. If the outdoor is connected with these accessories, then the same rules on the indoor setting is applied here also. The rules are as follow:

a) Each outdoor number must be unique. The outdoor address cannot duplicate.
b) The first outdoor address must be 0. Do not start the first outdoor with address 1.
c) While setting the outdoor address, the outdoor address number cannot skip. For example, if there are only 4 outdoors in a system, the outdoor address needs to be 0, 1, 2 and 3.
d) It is advisable that the outdoor address follow the sequence of the communication wiring. For example, for a 4 outdoors in the system, the first outdoor after the gateway should have address 0, the next outdoor address should be 1 and the last outdoor of the communication wiring should be 3.

S2.4	S2.5	S2.6	S2.7	S2.8	Outdoor Address
0	0	0	0	0	0
0	0	0	0	1	1
0	0	0	1	0	2
0	0	0	1	1	3
0	0	1	0	0	4
0	0	1	0	1	5
0	0	1	1	0	6
0	0	1	1	1	7
0	1	0	0	0	8
0	1	0	0	1	9
0	1	0	1	0	10
0	1	0	1	1	11
0	1	1	0	0	12
0	1	1	0	1	13
0	1	1	1	0	14
0	1	1	1	1	15

S2.4	S2.5	S2.6	S2.7	S2.8	Outdoor Address
1	0	0	0	0	16
1	0	0	0	1	17
1	0	0	1	0	18
1	0	0	1	1	19
1	0	1	0	0	20
1	0	1	0	1	21
1	0	1	1	0	22
1	0	1	1	1	23
1	1	0	0	0	24
1	1	0	0	1	25
1	1	0	1	0	26
1	1	0	1	1	27
1	1	1	0	0	28
1	1	1	0	1	29
1	1	1	1	0	30
1	1	1	1	1	31

Set up Dipswitch 3 (S3)



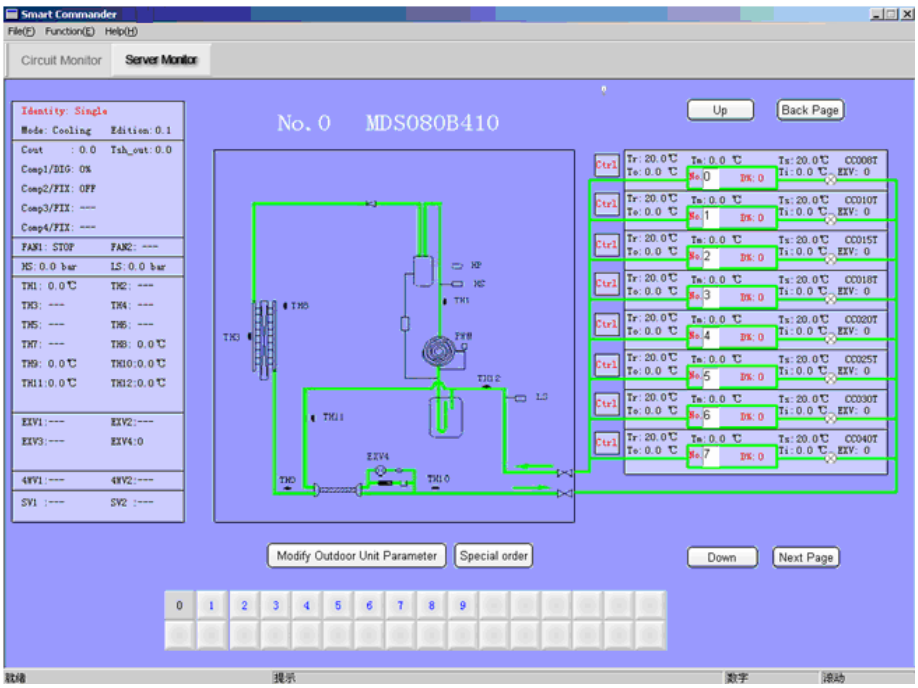
For Dipswitch S3, the main function is to determine the MDS-B series outdoor capacity. Besides this dipswitch, dipswitch S2.3 is also interrelated. The setting of the capacity is as follow:

S2.3	S3.1	S3.2	S3.3	S3.4	Capacity
0	0	0	0	0	8 HP
0	0	0	0	1	10 HP
0	0	0	1	0	12 HP
0	0	0	1	1	15 HP
0	0	1	0	0	18 HP
0	0	1	0	1	20 HP
0	0	1	1	0	22 HP
0	0	1	1	1	24 HP
0	1	0	0	0	26 HP
0	1	0	0	1	28 HP
0	1	0	1	0	30 HP
0	1	0	1	1	32 HP

S2.3	S3.1	S3.2	S3.3	S3.4	Capacity
0	1	1	0	0	34 HP
0	1	1	0	1	36 HP
0	1	1	1	0	38 HP
0	1	1	1	1	40 HP
1	0	0	0	0	42 HP
1	0	0	0	1	44 HP
1	0	0	1	0	46 HP
1	0	0	1	1	48 HP
1	0	1	0	0	50 HP
1	0	1	0	1	14 HP
1	0	1	1	0	16 HP

5.7 Power Up Outdoor

After the outdoor unit setting has completed, we may power up the outdoor unit to see if the wiring connection is correct. If the commissioning software (Smart Commander) is available, it is advisable to use it to run the commissioning. Connect the outdoor unit to the commissioning software accordingly (refer to Section 4.4) and run it. Go to drop down menu **Function (E)** and select **Initiating** to connect to the MDS system. Once the software is connected to the system, all available parameter of the system (Indoor and Outdoor) will be visible.



By using the software, check whether all indoor and outdoor units are connected. Besides that, the capacity and model of all indoor and outdoor units are verified. If there's any problem such as communication error and etc, kindly recheck the wiring of the communication cable and the setting of PCB. Error code will be recorded and shown in the software itself.

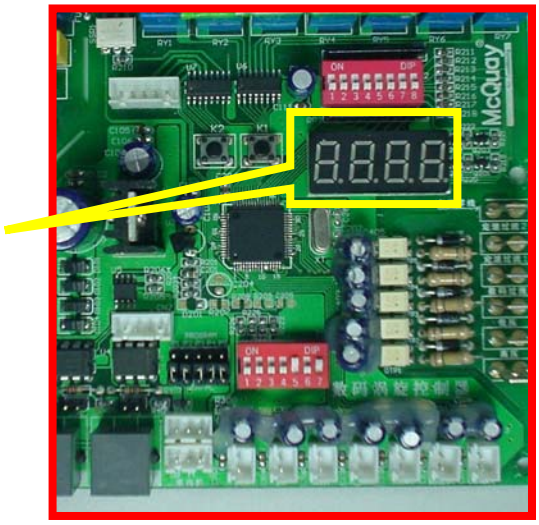
If commissioning software is not available, commissioner may manually check the MDS system by observing the parameter shown on the 7 segment LED display which is located on the outdoor PCB.

During this time, we need to check and observe the system to ensure it is running normally without any error. The 7 segment LED display located on the outdoor PCB will display related information such as running parameters and error code (if any). The running parameters and error code shown for MDOM PCB and MDS-M PCB are different. The running parameters for each of the PCB are shown below, while for error code, it will be discussed further in the next Chapter 6.0.

MDOM PCB Running Parameter

Outdoor Information / Reading

X - - -	YYYY
0	Compressor Discharge Temp
1	Ambient Temp
2	Compressor Suction Temp
3	Compressor Bottom Temp.
4	Condensing Coil Inlet Temp.
5	Condensing Coil Medium Temp.
6	Condensing Coil Outlet Temp.
7	EXV Opening Position
8	Modulation Percentage
9	PCB Control Time



For MDOM PCB, the readings of each information will continuously being displayed on the 7 segment LED display, from 0 to 9. For example, if we need to check the ambient temperature reading (number 1), wait for the display to show 1 and the following value will be the sensor's reading on ambient temperature.

MDS-M PCB Running Parameter

Code	Description	Code	Description
NULL	NULL：outdoor unit stand-by	CSP	CSP：outdoor in the course cooling stop
rEST	REST：outdoor unit resting	dSt	DST：outdoor starting to defrost
CSt	CST：outdoor starting to cool	dEF	DEF：outdoor/indoor defrosting
COOL	COOL：outdoor/indoor cooling	dSP	DSP：outdoor in the course defrost stop

Code	Description	Code	Description
HSt	HST：outdoor starting to heat	Prot	PROT: outdoor system malfunction protection
HEAt	HEAT: outdoor/indoor heating	tESt	TEST: outdoor hardware testing mode
HSP	HSP：outdoor in the course heating stop	OPEn	OPEN: open all EXV
Erro	ERRO: outdoor normal malfunction	OtHE	Othe: Other mode

For MDS-M PCB, the reading of sensors will not shown continuously like MDOM PCB. On the other hand, it will display the current status or running mode of the outdoor unit. For example, when the unit is on standby, it will display "NULL" on the 7 segment LED display. When the outdoor unit is running cooling mode, "COOL" will be displayed.

5.8 Start All Indoors

After confirming that the MDS system is ready in standby mode without any faulty operation or error code, turn on all indoor units one by one. This can be done through the commissioning software or manually turn on each indoor unit individually. Set the indoor temperature according to the design requirement. There are a few things which we need to check for outdoor and indoor:

Outdoor checking

- Check the compressor status (ON/OFF and its running capacity) as it should react according to the system's need.
- Check the high side (HS) and low side (LS) pressure to ensure they do not exceed the designed limit.
- Check the readings of discharge temperature sensor (TH1) and ensure it do not exceed the designed limit.
- Check the opening of EXV4 and subcool temperature (TH9 – TH10) for cooling mode.
- Check is there any error code from the outdoor unit.

Indoor checking

- Check the handset's functionality for each indoor such as setting swing mode and see whether or not the indoor unit is responding towards the handset's signal.
- Check the readings of indoor temperature sensor (T_i, T_m, T_o and T_r) and ensure they are normal.
- Check the opening of the EXV box and ensure it is functioning normally.
- Check is there any error code from the indoor unit.

5.9 Monitor Outdoor Parameter

After the commissioning personnel added in the additional refrigerant, it is advisable that they monitor the outdoor parameter. In order to guide the commissioning personnel, the factory side had provided a set of outdoor parameter for reference. There are 3 sets of reference data provided (3 sets for cooling cycle and 3 sets for heating cycle).

These data will serve as a guide on the possible operating condition of the unit. Once the outdoor parameter reach or close to the proposed data, the charging of the refrigerant can be stop. The commissioning personnel will need to continue to monitor the outdoor parameter for some time (1/2 to 1 hour). If the outdoor parameters remain constant or very small movement, the commissioning can be concluded.

For details, kindly refer to the following Appendix for the required model.

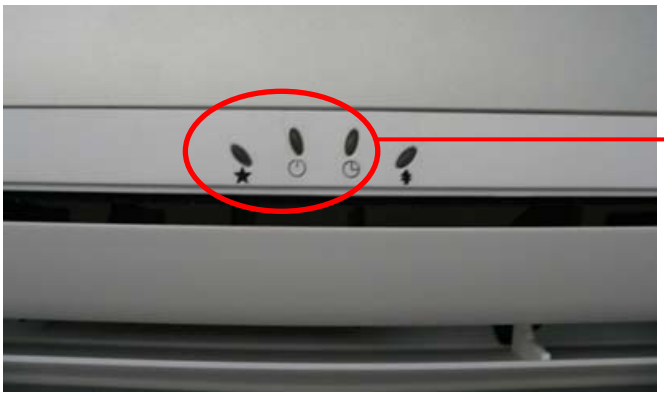
- Appendix 7.7 - R22 MDS A Series Cooling Cycle Reference
- Appendix 7.8 - R22 MDS B Series Cooling Cycle Reference
- Appendix 7.9 - R22 MDS A Series Heating Cycle Reference
- Appendix 7.10 - R22 MDS B Series Heating Cycle Reference
- Appendix 7.11 - R410A MDS B Series Cooling Cycle Reference
- Appendix 7.12 - R410A MDS B Series Heating Cycle Reference

6.0 Troubleshooting

6.1 Locating Error Code

Error code will show on both indoor and outdoor units when the system malfunctions. For decorative type indoor such as wall mounted, ceiling cassette and ceiling convertible, the error code will display via the blinking of the LED. For units that are connected to the wired controller MC301 (such as ceiling concealed), the error code will display on controller screen. For outdoor unit, the error code generated will display on the 7 segments display on outdoor PCB. Each of these locations is indicated as below:

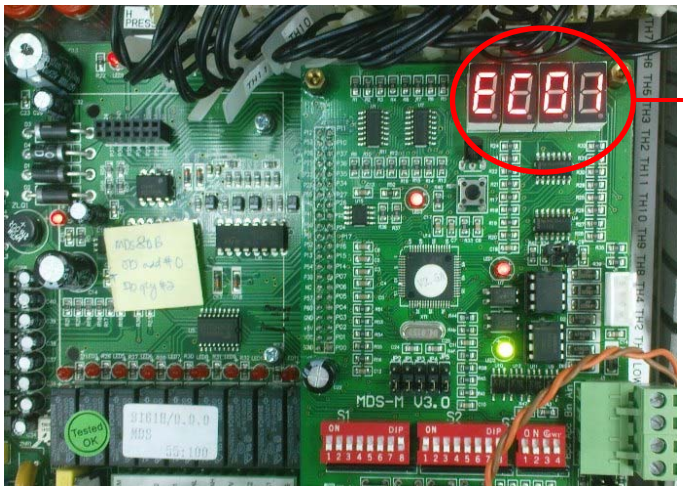
Error code display for decorative indoor



Remark: Ionizer LED does not contribute to error code blinking.

Error code display for wired handset

Error code display for outdoor unit



6.2 Error Code for Decorative Type Indoor

		Page
Error Code #1	Cool/Heat: BLINKING; Sleep/Fan: OFF; Dry/Timer: OFF	76
Description	Communication error	
Possible causes	• Indoor and outdoor communication wire broken • Indoor and outdoor communication wire loose • Indoor and outdoor communication wire A and B reversed • Communication wire too long, should less than 1000m • Outdoor PCB not power on • Indoor and outdoor jumper not correct, still on update status • Last indoor unit terminal resistance of communication wire not short-circuit • Indoor and outdoor PCB program not compatible • Indoor and outdoor PCB abnormal	
Error Code #2	Cool/Heat: OFF; Sleep/Fan: OFF; Time/Dry: BLINKING	73
Description	Indoor sensor error	
Possible causes	• Indoor sensor broken or loose	
Error Code #3	Cool/Heat: OFF; Sleep/Fan: BLINKING; Time/Dry: OFF	75
Description	Indoor pump error	
Possible causes	• Water level switch broken • Indoor pump broken	
Error Code #4	Cool/Heat: OFF; Sleep/Fan: BLINKING; Time/Dry: BLINKING	73
Description	Outdoor sensor error	
Possible causes	• Outdoor sensor broken or loose	
Error Code #5	Cool/Heat: BLINKING; Sleep/Fan: BLINKING; Time/Dry: ON	74
Description	Outdoor pressure sensor error	
Possible causes	• High/low pressure sensor broken or loose • Outdoor PCB HS/LS port broken	

Error Code #6

Cool/Heat	Sleep/Fan	Time/Dry
BLINKING	OFF	BLINKING

78

Description

High/low pressure switch trip

Possible causes

- High pressure trip
  - outdoor unit motor broken
  - outdoor circulating air short (cooling)
  - outdoor heat exchanger too dirty (cooling)
  - outdoor ball valve not open
  - indoor circulating air short (heating)
  - indoor heat exchanger too dirty (heating)
  - indoor unit filter web blocked (heating)
  - indoor unit EXV not turn on properly (heating)
  - too much refrigerant
  - outdoor unit PCB high pressure output port malfunction
  - pressure sensor broken
  - pressure switch broken
- Low pressure trip
  - Outdoor ball valve not open
  - Outdoor heat exchanger efficiency too low when heating
  - Outdoor motor run abnormally when heating
  - Refrigerant leakage or insufficient
  - Outdoor PCB low pressure output port abnormal
  - Low pressure sensor broken

6

Error Code #7

Cool/Heat	Sleep/Fan	Time/Dry
BLINKING	BLINKING	OFF

77

Description

Compressor overload

Possible causes

- Digital compressor's operating current too high, overload protector on
- Fixed compressor's operating current too high, overload protector on

Error Code #8

Cool/Heat	Sleep/Fan	Time/Dry
BLINKING	BLINKING	BLINKING

80

Description

System failure

Possible causes

- High pressure malfunction occur 3 times within 1 hour
- Low pressure malfunction occur 3 times within 1 hour
- Too high discharge temperature occur once
- Compressor overload protector shut and occur 3 times

Error Code #9

Cool/Heat	Sleep/Fan	Time/Dry
BLINKING	ON	ON

——

Description

Others

Possible causes

- Examine outdoor unit for error code.
- Connect wired controller to the unit to retrieve exact error code.

6.3 Indoor Error Code for Wired Controller MC301

Error Code	Description	Possible Causes	Page
E0	System malfunction	• High pressure malfunction occur 3 times within 1 hour - outdoor unit motor broken (cooling) - outdoor circulating air short (cooling) - outdoor heat exchanger too dirty (cooling) - outdoor ball valve not open - indoor circulating air short (heating) - indoor heat exchanger too dirty (heating) - indoor unit filter web blocked (heating) - indoor unit EXV not turn on properly (heating) - too much refrigerant - outdoor unit PCB high pressure output port malfunction - pressure sensor broken - pressure switch broken • Low pressure malfunction occur 3 times within 1 hour - outdoor ball valve not open - refrigerant leakage or shortage - outdoor unit PCB low pressure output port malfunction - low pressure sensor broken • Too high discharge temperature occur once - outdoor unit motor broken (cooling) - outdoor circulating air short (cooling) - outdoor heat exchanger too dirty (cooling) - outdoor unit EXV not turn on properly (heating) - indoor unit EXV not turn on properly - refrigerant leakage or shortage - outdoor ball valve not turns on • Compressor overload protector shut and occurs 3 times - too much current flow in the compressor - compressor overload protector protecting value wrongly set	80
E1	TH1 open/short circuit (discharge T.)	• Outdoor discharge temperature sensor TH1 broken or loose	73
E2	TH2 open/short circuit (1# inlet coil)	• Outdoor 1# condenser inlet coil temperature sensor TH2 broken or loose	
E3	TH3 open/short circuit (1# midlet coil)	• Outdoor 1# condenser midlet coil temperature sensor TH3 broken or loose	
E4	TH4 open/short circuit (2# inlet coil)	• Outdoor 2# condenser inlet coil temperature sensor TH4 broken or loose	
E5	TH5 open/short circuit (2# midlet coil)	• Outdoor 2# condenser midlet coil temperature sensor TH5 broken or loose	
E8	TH8 open/short circuit (ambient T.)	• Outdoor ambient temperature sensor TH8 broken or loose	
E9	TH9 open/short circuit (outlet T.)	• Outdoor outlet coil temperature sensor TH9 broken or loose	
EA	TH10 open/short circuit (sub-cool outlet)	• Outdoor sub-cool outlet temperature sensor TH10 broken or loose	
EB	TH11 open/short circuit (sub-cool suction)	• Outdoor sub-cool suction temperature sensor TH11 broken or loose	

EC	TH12 open/short circuit (suction)	• Outdoor suction temperature sensor TH12 broken or loose	73
EF	Emergency run	• On the premise that part of the indoor unit communication malfunction and either one (or both) of the following error occurs (unit will shut down): 1. System sub heat <1ºC for 15 minutes 2. TH12 malfunctions	87
F0	Outdoor storage malfunction	• Outdoor PCB chip read faulty at the very beginning when power on • Outdoor PCB chip broken	82
F1	Indoor inlet coil sensor malfunction	• Indoor units T_{in} sensor broken or loose	73
F2	Indoor midlet coil sensor malfunction	• Indoor units T_{mid} sensor broken or loose	
F3	Indoor outlet coil sensor malfunction	• Indoor units T_{out} sensor broken or loose	
F4	Indoor return air sensor broken	• Indoor units T_{room} sensor broken or loose	
F5	Indoor supply air sensor broken	• Indoor units T_{room} sensor broken or loose	
F6	Indoor and controller communication malfunction	• Wired controller communication wire not connected or loose • Wired controller broken • Outdoor PCB broken	83
F7	Ambient temperature exceed running range	• Outdoor ambient temperature exceed running range 1. cooling running range 0 – 43ºC 2. heating running range -15 – 16 ºC • Outdoor circulating air short 1. Cause outdoor ambient temperature rising to exceed running range when cooling. 2. Cause outdoor ambient temperature falling to exceed running range when heating.	84
FA	Wired controller storage broken	• Data read faultily at the very beginning when power on • Chip broken	85
FB	Pump malfunction (indoor drain pump)	• Overflow switch broken • Pump broken	75
FC	Indoor and outdoor communication malfunction	• Indoor and outdoor communication wire broken • Indoor and outdoor communication wire loose • Indoor and outdoor communication wire A and B reversed • Communication wire too long, should less than 1000m • Outdoor PCB not power on • Indoor and outdoor jump wire not correct, still on update status • Last indoor unit terminal resistance of communication wire not short-circuit • Indoor and outdoor PCB program not compatible • Indoor and outdoor PCB abnormal	76

FE	Master unit and slave unit communication malfunction	• Master unit and slave unit communication wire reversed • Master unit and slave unit communication wire broken or loose • Slave unit toggle switch set wrongly • Master and slave unit PCB version conflict / different	79
H0	Digital compressor overloaded	• Digital compressor operating current too high, overload protector OL4 on	77
H1	Fixed compressor 1 overloaded	• Fixed compressor 1 operating current too high, overload protector OL1 on	
H2	Fixed compressor 2 overloaded	• Fixed compressor 2 operating current too high, overload protector OL2 on	
H3	Fixed compressor 3 overloaded	• Fixed compressor 3 operating current too high, overload protector OL3 on	
H4	High pressure too high	• Outdoor motor broken (cooling) • Outdoor circulating air short-circuit (cooling) • Outdoor heat exchanger too dirty (cooling) • Outdoor ball valve not open • Indoor circulating air short-circuit (heating) • Indoor heat exchanger too dirty (heating) • Indoor unit filter blocked by dirt (heating) • Indoor EXV not on properly (heating) • Refrigerant over charged • Outdoor PCB high pressure output port abnormal • Pressure sensor broken • Pressure switch broken	78
H5	High pressure sensor malfunction	• High pressure sensor communication wire broken • Outdoor PCB HS port broken	74
H6	Discharge temperature too high (TH1)	• Outdoor motor broken (cooling) • Outdoor circulation air short-circuit (cooling) • Outdoor heat exchanger too dirty (cooling) • Outdoor EXV not on properly (heating) • Indoor EXV not on properly (heating) • Refrigerant leakage or insufficient • Outdoor ball valve not open	78
L0	Super heat protecting value too small	• Indoor motor not work when cooling • Indoor EXV opening degree abnormal when cooling • Outdoor motor not work when heating • Outdoor EXV opening degree abnormal when heating • Low pressure sensor abnormal • Refrigerant over charged	86
L1	Low pressure too low	• Outdoor ball valve not open • Outdoor heat exchanger efficiency too low when heating • Outdoor motor run abnormally when heating • Refrigerant leakage or insufficient • Outdoor PCB low pressure output port abnormal • Low pressure sensor broken	78

L2	Low pressure sensor broken	• Low pressure sensor connecting wire broken • Outdoor PCB LS port broken	74
L3	Indoor and outdoor communication	• Outdoor work normal, but all indoor communication abnormal	76
10	System malfunction (slave unit)	• Slave unit high pressure malfunction occurred 3 times • Low pressure malfunction occurred 3 times • Discharge temperature too high 1 times • Compressor overload protector jumped for 3 times	80
11	TH1 open/short-circuit (slave unit discharge)	• Slave unit discharge temperature sensor TH1 broken or loose	73
12	TH2 open/short-circuit (slave unit 1# inlet coil)	• Slave unit 1# inlet coil temperature sensor TH2 broken or loose	
13	TH3 open/short-circuit (slave unit 1# midlet coil)	• Slave unit 1# midlet coil temperature sensor TH3 broken or loose	
14	TH4 open/short-circuit (slave unit 2# inlet coil)	• Slave unit 2# inlet coil temperature sensor TH4 broken or loose	
15	TH5 open/short-circuit (slave unit 2# midlet coil)	• Slave unit 2# midlet coil temperature sensor TH5 broken or loose	
18	TH8 open/short-circuit (slave unit ambient temperature)	• Slave unit ambient temperature sensor TH8 broken or loose	
19	TH9 open/short-circuit (slave unit total outlet coil)	• Slave unit outlet coil temperature sensor TH9 broken or loose	
1A	TH10 open/short-circuit (slave unit sub-cooling outlet)	• Slave unit sub-cooling outlet coil temperature sensor TH10 broken or loose	
1B	TH11 open/short-circuit (slave unit super cooling suction temperature)	• Slave unit super-cooling suction temperature sensor TH11 broken or loose	
1C	TH12 open/short-circuit (slave unit suction temperature)	• Slave unit suction temperature sensor TH12 broken or loose	
1F	Emergency run	• Premise: part indoor communication failure • Slave unit suction super-heat less than 1ºC for 15 minutes persistently. • Slave unit TH12 malfunction	87
20	Outdoor storage malfunction (slave unit)	• Slave unit PCB chip data read failure by outdoor unit when power on • Slave unit PCB chip broken	82

27	Ambient temperature is out of operation limit range (slave unit)	• Ambient temperature is out of operation limit range 1. Cooling ambient temperature range: 0ºC – 43ºC 2. Heating ambient temperature range: -15ºC – 16ºC • Outdoor slave unit circulating air short-circuit 1. Result in ambient temperature raising to exceed operation limit range when cooling 2. Result in ambient temperature falling down to exceed operation limit range when heating	84
30	Digital compressor overloaded (slave unit)	• Fixed compressor 4 operating current too high, overload protector OL4 on	77
31	Fixed compressor 1 overloaded (slave unit)	• Fixed compressor 1 operating current too high, overload protector OL1 on	
32	Fixed compressor 2 overloaded (slave unit)	• Fixed compressor 2 operating current too high, overload protector OL2 on	
33	Fixed compressor 3 overloaded (slave unit)	• Fixed compressor 3 operating current too high, overload protector OL3 on	
34	High pressure too high (slave unit)	• Slave unit motor broken • Slave unit circulation air short-circuiting (cooling) • Slave unit heat exchanger too dirty (cooling) • Slave unit ball valve not open • Indoor circulation air short-circuit (heating) • Indoor heat exchanger too dirty (heating) • Indoor unit filter blocked by dirt (heating) • Indoor EXV not switched on properly (heating) • Refrigerant over charged • Slave unit PCB high pressure output port abnormal • Slave unit pressure sensor broken • Slave unit pressure switch broken	78
35	High pressure sensor malfunction (slave unit)	• Slave unit high pressure sensor connecting wire broken • Slave unit PCB HS port broken	74
36	Discharge temperature too high (slave unit)	• Preserved	-
40	Super heat protecting value too small (slave unit)	• Indoor motor not work when cooling • Indoor EXV opening degree abnormal when cooling • Outdoor motor not work when heating • Slave unit EXV opening degree abnormal when heating • Slave unit low pressure sensor abnormal • Refrigerant over charged	86
41	Low pressure too low (slave unit)	• Slave unit ball valve not open • Slave unit heat exchanger efficiency too low when heating • Slave unit motor run abnormally when heating • Refrigerant leaked or insufficient charged • Slave unit PCB low pressure output port abnormal • Slave unit low pressure sensor broken	78
42	Low pressure sensor broken (slave unit)	• Slave unit low pressure sensor connecting wire broken • Slave unit PCB LS port broken	74

6.4 Outdoor Error Code for MDOM PCB

Error Code	Description	Possible Causes	Page
C-	Communication failure between outdoor and all indoor	• Indoor and outdoor communication wire broken • Indoor and outdoor communication wire loose • Indoor and outdoor communication wire A and B reversed • Communication wire too long, should less than 1000m • Outdoor PCB not power on • Indoor and outdoor jump wire not correct, still on update status • Last indoor unit terminal resistance of communication wire not short-circuit • Indoor and outdoor PCB program not compatible • Indoor and outdoor PCB abnormal	76
CX	"X" indoor no. Particular indoor no communication	• Indoor "X" and outdoor communication wire broken • Indoor "X" and outdoor communication wire loose • Indoor "X" and outdoor communication wire A B reverse • Indoor "X" and outdoor jump wire not correct, still on update status • Indoor "X" and outdoor PCB program not compatible • Indoor "X" and outdoor PCB abnormal	
E0	Discharge temperature sensor malfunction	• Outdoor discharge temperature sensor broken or loose	73
E1	Outdoor ambient temperature sensor malfunction	• Outdoor ambient temperature sensor broken or loose	
E2	Suction temperature sensor malfunction	• Suction temperature sensor broken or loose	
E3	Compressor base temperature sensor malfunction	• Compressor base temperature sensor broken or loose	
E4	Coil inlet temperature sensor malfunction	• Coil inlet temperature sensor broken or loose	
E5	Coil midlet temperature sensor malfunction	• Coil midlet temperature sensor broken or loose	
E6	Coil outlet temperature sensor malfunction	• Coil outlet temperature sensor broken or loose	
E7	Compressor discharge temperature too high (>130ºC)	• Outdoor motor broken (cooling) • Outdoor circulation air short-circuit (cooling) • Outdoor heat exchanger too dirty (cooling) • Outdoor EXV not on properly (heating) • Indoor EXV not on properly (heating) • Refrigerant leakage or insufficient • Outdoor service valve/ball valve not open	78

E8	General system failure	• High pressure malfunction occur 3 times within 1 hour - outdoor unit motor broken (cooling) - outdoor circulating air short (cooling) - outdoor heat exchanger too dirty (cooling) - outdoor ball valve not open - indoor circulating air short (heating) - indoor heat exchanger too dirty (heating) - indoor unit filter web blocked (heating) - indoor unit EXV not turn on properly (heating) - too much refrigerant - outdoor unit PCB high pressure output port malfunction - pressure sensor broken - pressure switch broken • Low pressure malfunction occur 3 times within 1 hour - outdoor ball valve not open - refrigerant leakage or shortage - outdoor unit PCB low pressure output port malfunction - low pressure sensor broken • Too high discharge temperature occur once - outdoor unit motor broken (cooling) - outdoor circulating air short (cooling) - outdoor heat exchanger too dirty (cooling) - outdoor unit EXV not turn on properly (heating) - indoor unit EXV not turn on properly - refrigerant leakage or shortage - outdoor ball valve not open • Compressor overload protector shut and occurs 3 times - too much current flow in the compressor - compressor overload protector protecting value wrongly set	80
H1	High pressure trip	• Outdoor motor broken (cooling) • Outdoor circulating air short-circuit (cooling) • Outdoor heat exchanger too dirty (cooling) • Outdoor ball valve not open • Indoor circulating air short-circuit (heating) • Indoor heat exchanger too dirty (heating) • Indoor unit filter blocked by dirt (heating) • Indoor EXV not on properly (heating) • Refrigerant over charged • Outdoor PCB high pressure output port abnormal • Pressure sensor broken • Pressure switch broken	78
H2	Digital scroll compressor overload	• Digital compressor operating current too high, overload protector on	77
H3	Fixed scroll compressor overload	• Fixed scroll compressor operating current too high, overload protector on	
L1	Low pressure trip	• Outdoor ball valve not open • Outdoor heat exchanger efficiency too low when heating • Outdoor motor run abnormally when heating • Refrigerant leakage or insufficient • Outdoor PCB low pressure output port abnormal • Low pressure sensor broken	78

6.5 Outdoor Error Code for MDS-M PCB

Error Code	Description	Possible Causes	Page
R22	Wrong combination of PCB and software	• PCB hardware is designed for R22 but software for R410A unit is installed into it.	88
R410	Wrong combination of PCB and software	• PCB hardware is designed for R410A but software for R22 unit is installed into it.	88
ERSE	Wrong dipswitch setting	• Outdoor dipswitch setting wrong • Outdoor model dipswitch setting wrong	89
EC00 - EC47	00# - 47# indoor unit communication failure	• Indoor 00# - 47# and outdoor communication wire broken • Indoor 00# - 47# and outdoor communication wire loose • Indoor 00# - 47# and outdoor communication wire A B reverse • Indoor 00# - 47# and outdoor jump wire not correct, still on update status • Indoor 00# - 47# and outdoor PCB program not compatible • Indoor 00# - 47# and outdoor PCB abnormal	76
ER48	Digital compressor overload	• Digital compressor operating current too high, overload protector OL4 on	77
ER49	Fixed compressor 1 overload	• Fixed compressor 1 operating current too high, overload protector OL1 on	
ER50	Fixed compressor 2 overload	• Fixed compressor 2 operating current too high, overload protector OL2 on	
ER51	Fix compressor 3 overload	• Fixed compressor 3 operating current too high, overload protector OL3 on	
ER52	Discharge pressure too high	• Outdoor motor broken (cooling) • Outdoor circulating air short-circuit (cooling) • Outdoor heat exchanger too dirty (cooling) • Outdoor ball valve not open • Indoor circulating air short-circuit (heating) • Indoor heat exchanger too dirty (heating) • Indoor unit filter blocked by dirt (heating) • Indoor EXV not on properly (heating) • Refrigerant over charged • Outdoor PCB high pressure output port abnormal • Pressure sensor broken • Pressure switch broken	78
ER53	Suction pressure is too low	• Outdoor ball valve not open • Outdoor heat exchanger efficiency too low when heating • Outdoor motor run abnormally when heating • Refrigerant leakage or insufficient • Outdoor PCB low pressure output port abnormal • Low pressure sensor broken	
ER54	Outdoor unit's IC error	• Outdoor PCB chip read faultily at the very beginning when power on • Outdoor PCB chip broken	82

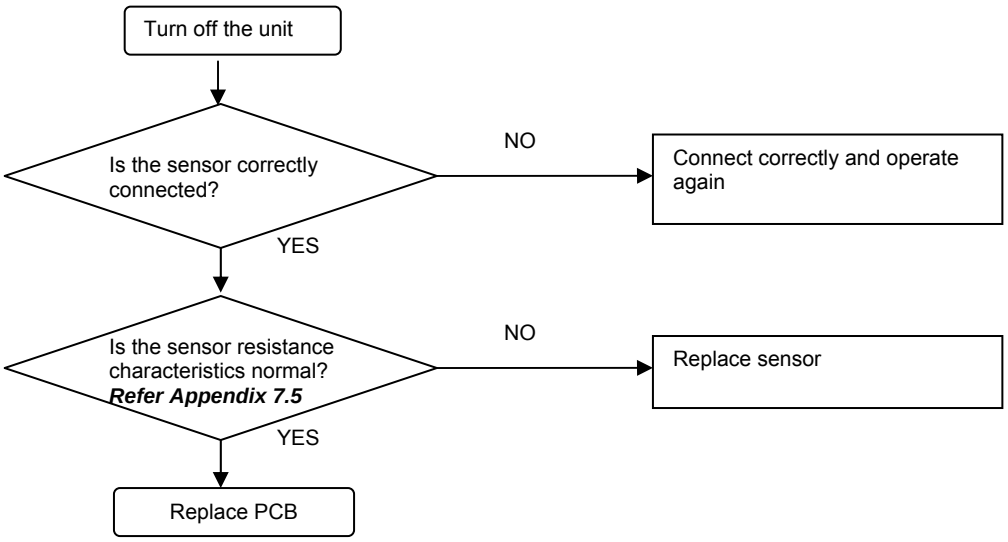
ER55	System error	• High pressure malfunction occur 3 times within 1 hour - outdoor unit motor broken (cooling) - outdoor circulating air short (cooling) - outdoor heat exchanger too dirty (cooling) - outdoor ball valve not open - indoor circulating air short (heating) - indoor heat exchanger too dirty (heating) - indoor unit filter web blocked (heating) - indoor unit EXV not turn on properly (heating) - too much refrigerant - outdoor unit PCB high pressure output port malfunction - pressure sensor broken - pressure switch broken • Low pressure malfunction occur 3 times within 1 hour - outdoor ball valve not open - refrigerant leakage or shortage - outdoor unit PCB low pressure output port malfunction - low pressure sensor broken • Too high discharge temperature occur once - outdoor unit motor broken (cooling) - outdoor circulating air short (cooling) - outdoor heat exchanger too dirty (cooling) - outdoor unit EXV not turn on properly (heating) - indoor unit EXV not turn on properly - refrigerant leakage or shortage - outdoor ball valve not turns on • Compressor overload protector shut and occurs 3 times - too much current flow in the compressor - compressor overload protector protecting value wrongly set	80
ER56	Discharge temperature is too high	• Outdoor motor broken (cooling) • Outdoor circulation air short-circuit (cooling) • Outdoor heat exchanger too dirty (cooling) • Outdoor EXV not on properly (heating) • Indoor EXV not on properly (heating) • Refrigerant leakage or insufficient • Outdoor ball valve not open	78
ER59	Ambient temperature is beyond the limit	• Outdoor ambient temperature exceed running range - cooling running range 0 – 43ºC - heating running range -15 – 16 ºC • Outdoor circulating air short - Cause outdoor ambient temperature rising to exceed running range when cooling. - Cause outdoor ambient temperature falling to exceed running range when heating.	84
ER60	Emergency run	• On the premise that part of the indoor unit communication malfunction and either one (or both) of the following error occurs (unit will shut down): 1. System sub heat <1ºC for 15 minutes 2. TH12 malfunctions	87
ER61	Super heat is beyond the limit	• Indoor motor not working when cooling • Indoor EXV opening degree abnormal when cooling • Outdoor motor not working when heating • Outdoor EXV opening degree abnormal when heating • Low pressure sensor abnormal • Refrigerant over charged	86

ER63	Slave outdoor unit communication failure	• Master and slave communication wire broken • Master and slave communication wire loose • Master and slave communication wire A B reversed • Slave unit power not on • Master and slave jump wire not correct, still on update status • Last outdoor unit terminal resistance of communication wire not short-circuit • Master and slave PCB program not compatible. • Master and slave PCB abnormal	79
ER64	TH1 temperature sensor failure	• Outdoor discharge temperature sensor TH1 broken or loose	73
ER65	TH2 temperature sensor failure	• Outdoor 1# condenser inlet coil temperature sensor TH2 broken or loose	
ER66	TH3 temperature sensor failure	• Outdoor 1# condenser midlet coil temperature sensor TH3 broken or loose	
ER67	TH4 temperature sensor failure	• Outdoor 2# condenser inlet coil temperature sensor TH4 broken or loose	
ER68	TH5 temperature sensor failure	• Outdoor 2# condenser midlet coil temperature sensor TH5 broken or loose	
ER71	TH8 temperature sensor failure	• Outdoor ambient temperature sensor TH8 broken or loose	
ER72	TH9 temperature sensor failure	• Outdoor outlet coil temperature sensor TH9 broken or loose	
ER73	TH10 temperature sensor failure	• Outdoor sub-cool outlet temperature sensor TH10 broken or loose	
ER74	TH11 temperature sensor failure	• Outdoor sub-cool suction temperature sensor TH11 broken or loose	
ER75	TH12 temperature sensor failure	• Outdoor suction temperature sensor TH12 broken or loose	
ER76	High pressure sensor failure	• High pressure sensor communication wire broken • Outdoor PCB HS port broken	74
ER77	Low pressure sensor failure	• Low pressure sensor connecting wire broken • Outdoor PCB LS port broken	
EC78	All indoor units communication failure	• Indoor and outdoor communication wire broken • Indoor and outdoor communication wire loose • Indoor and outdoor communication wire A and B reversed • Communication wire too long, should less than 1000m • Outdoor PCB not power on • Indoor and outdoor jump wire not correct, still on update status • Last indoor unit terminal resistance of communication wire not short-circuit • Indoor and outdoor PCB program not compatible • Indoor and outdoor PCB abnormal	76

6.6 Troubleshooting Flow Chart

Indoor/outdoor sensor failure
Error code: Decorative Error code #2 and #4, E1 to EC, F1 to F5, 11 to 1C (For MC301), E0 to E6 (For MDOM PCB), ER64 to ER75 (For MDS-M PCB)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



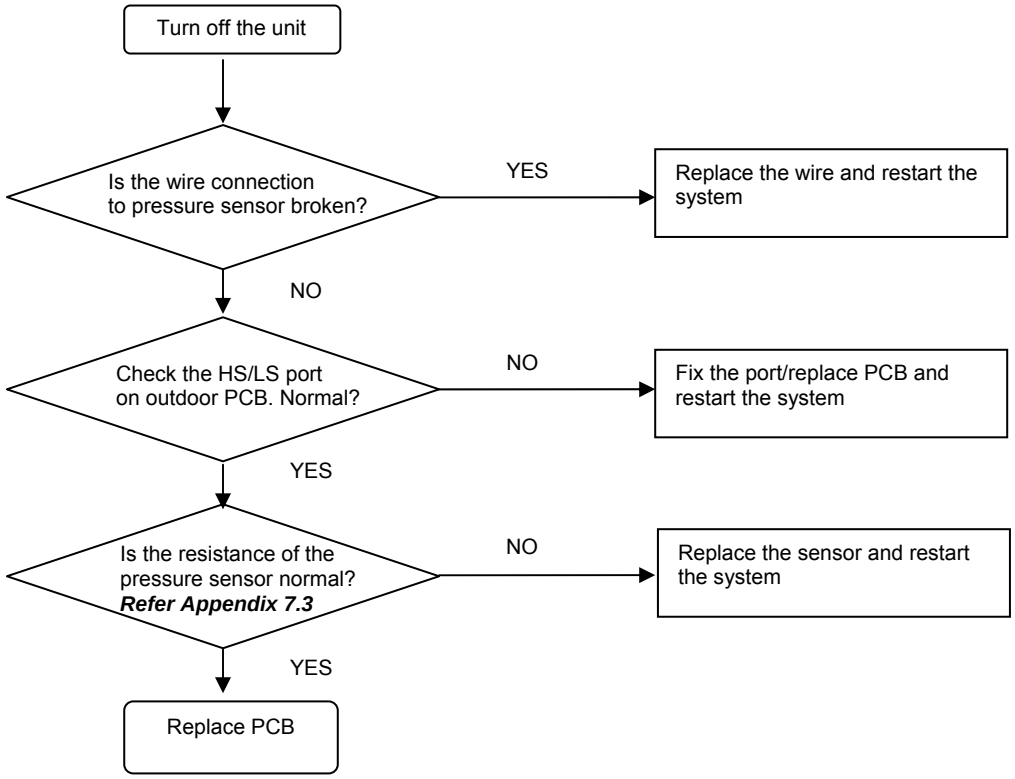
Remark:

OD	:	Outdoor
ID	:	Indoor
Spec	:	Specification
PCB	:	Control Module/Control Board

Outdoor pressure sensor error

Error Code: Decorative Error code #5, H5, L2, 35, 42 (For MC301), ER76 and ER77 (For MDS-M PCB)

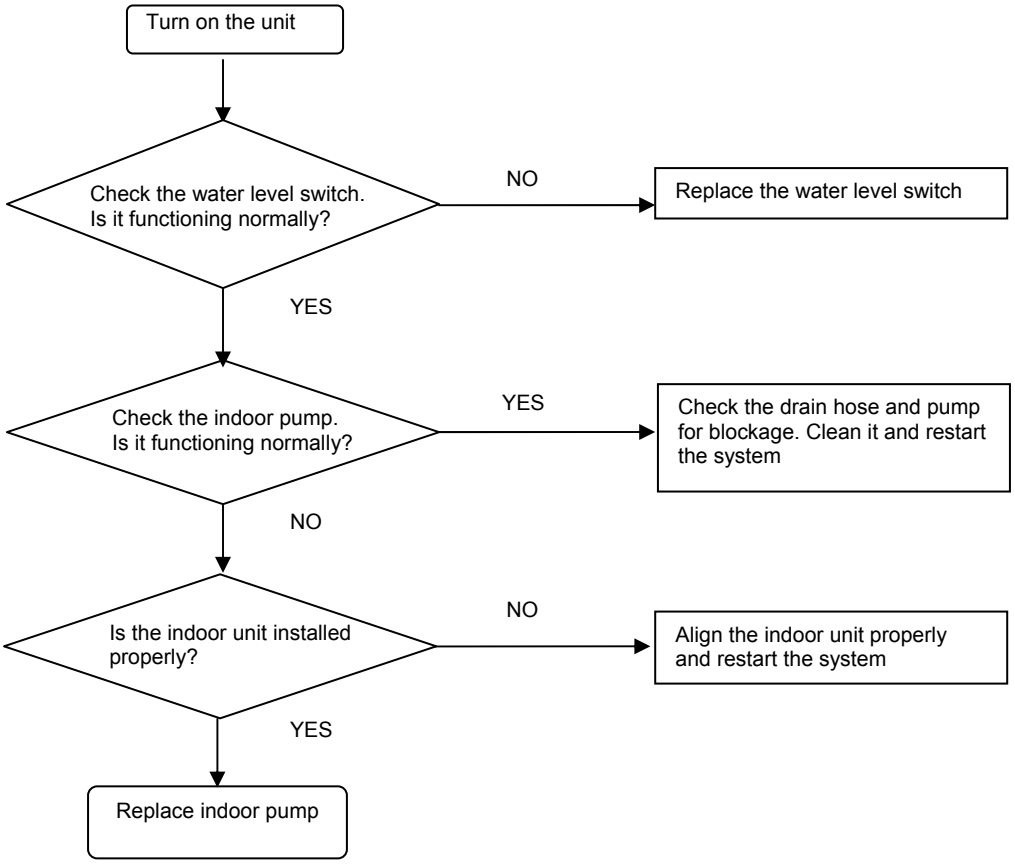
Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



Indoor pump error

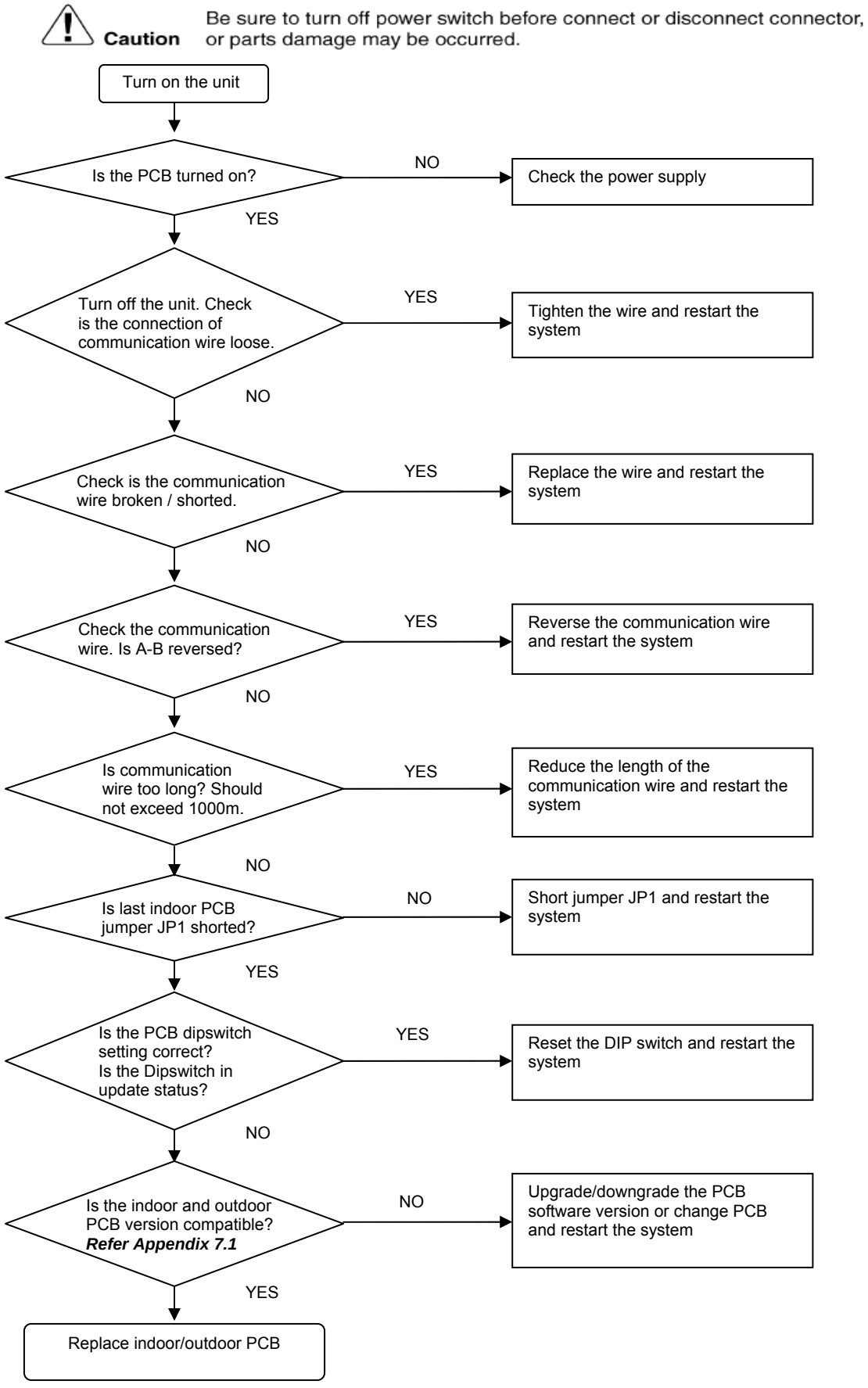
Error Code: Decorative Error code #3, FB (For MC301)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



Communication error

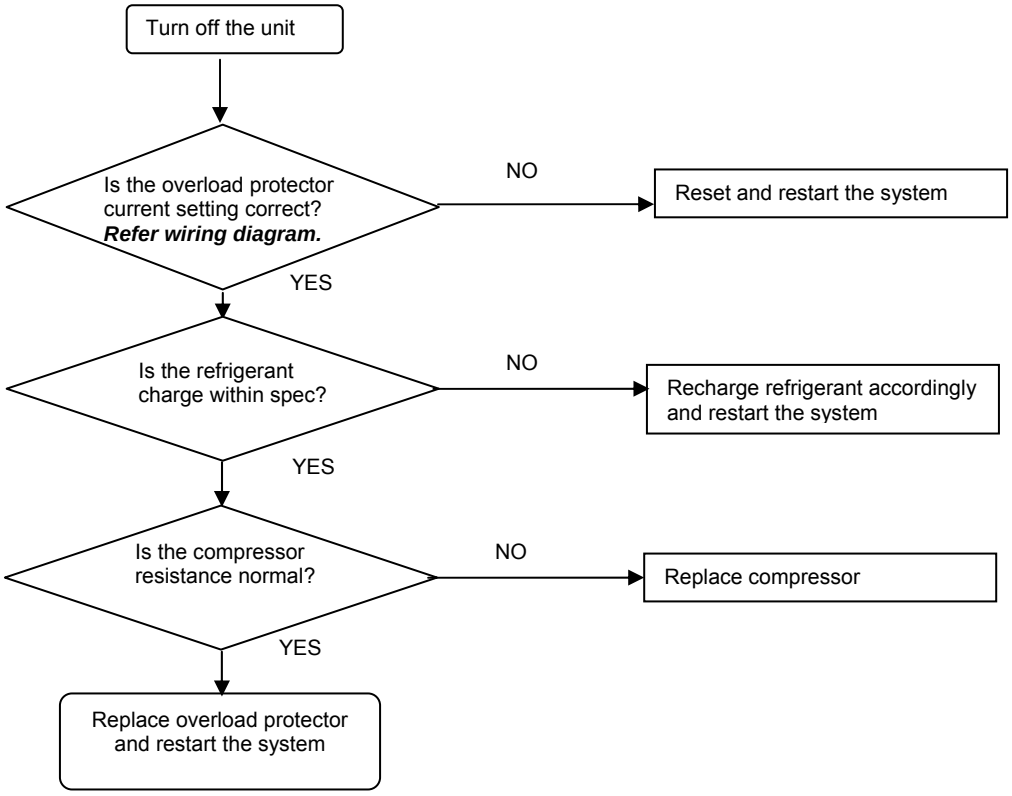
Error Code: Decorative Error code #1, FC, L3 (For MC301), C- to CX (For MDOM PCB), EC00 to EC47, EC78 (For MDS-M PCB)



Compressor overload

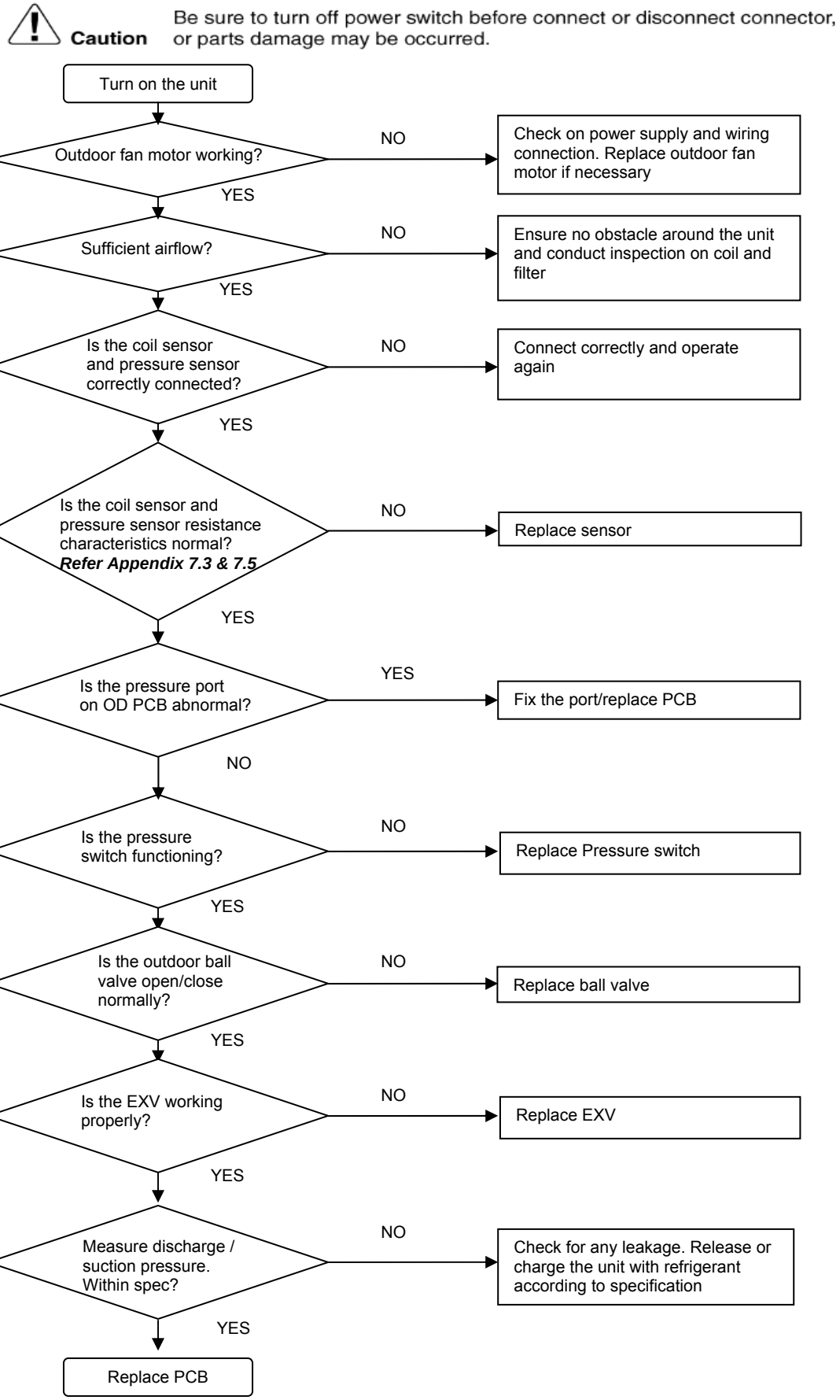
Error Code: Decorative Error code #7, H0 to H3, 30 to 33 (For MC301), H2 to H3 (For MDOM PCB), ER48 to ER51 (For MDS-M PCB)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



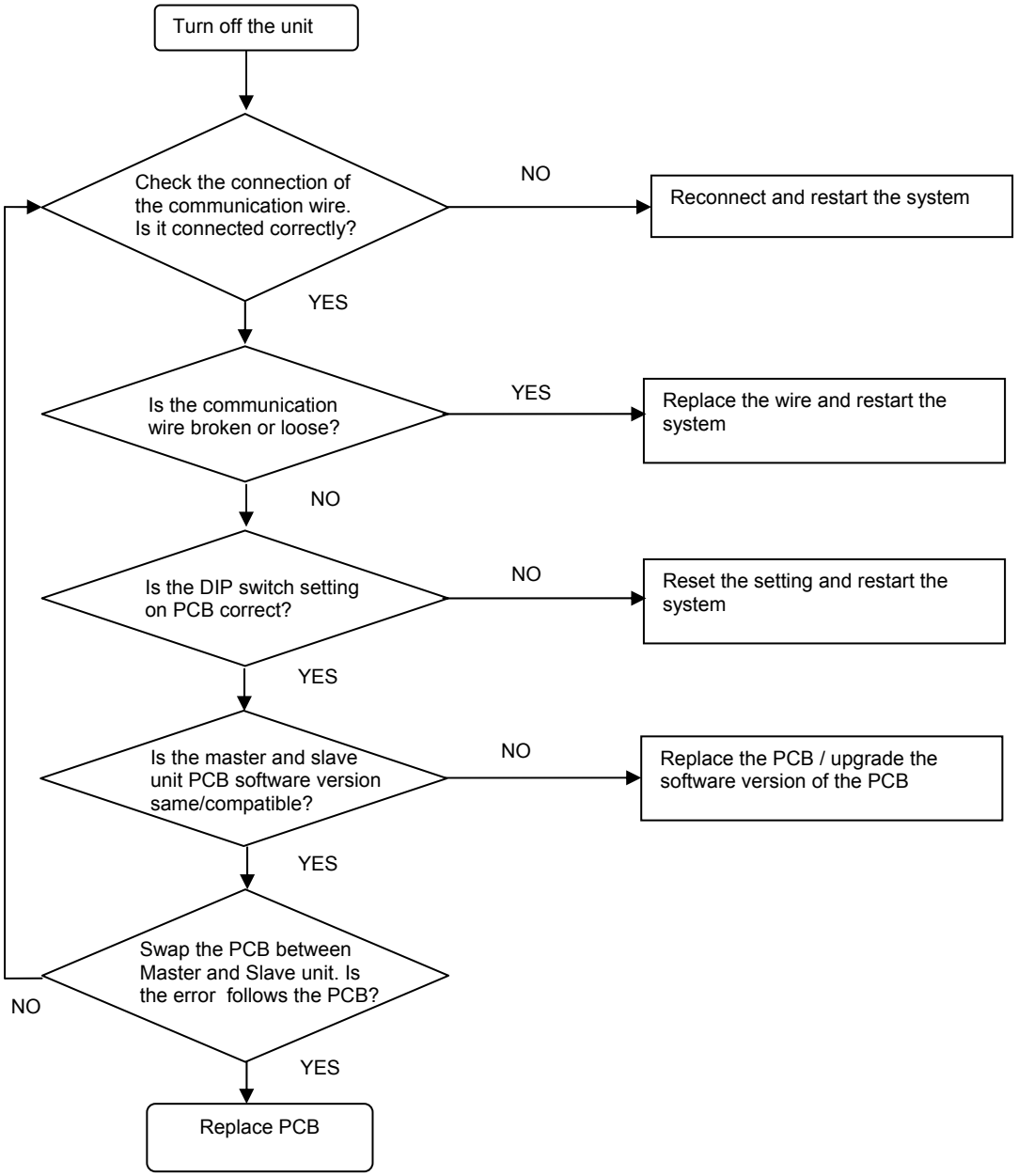
High/low pressure switch trip error

Error Code: Decorative Error code #6, H4, H6, L1, 34, 41 (For MC301), E7, H1, L1 (For MDOM PCB), ER52 to ER53, ER56 (For MDS-M PCB)



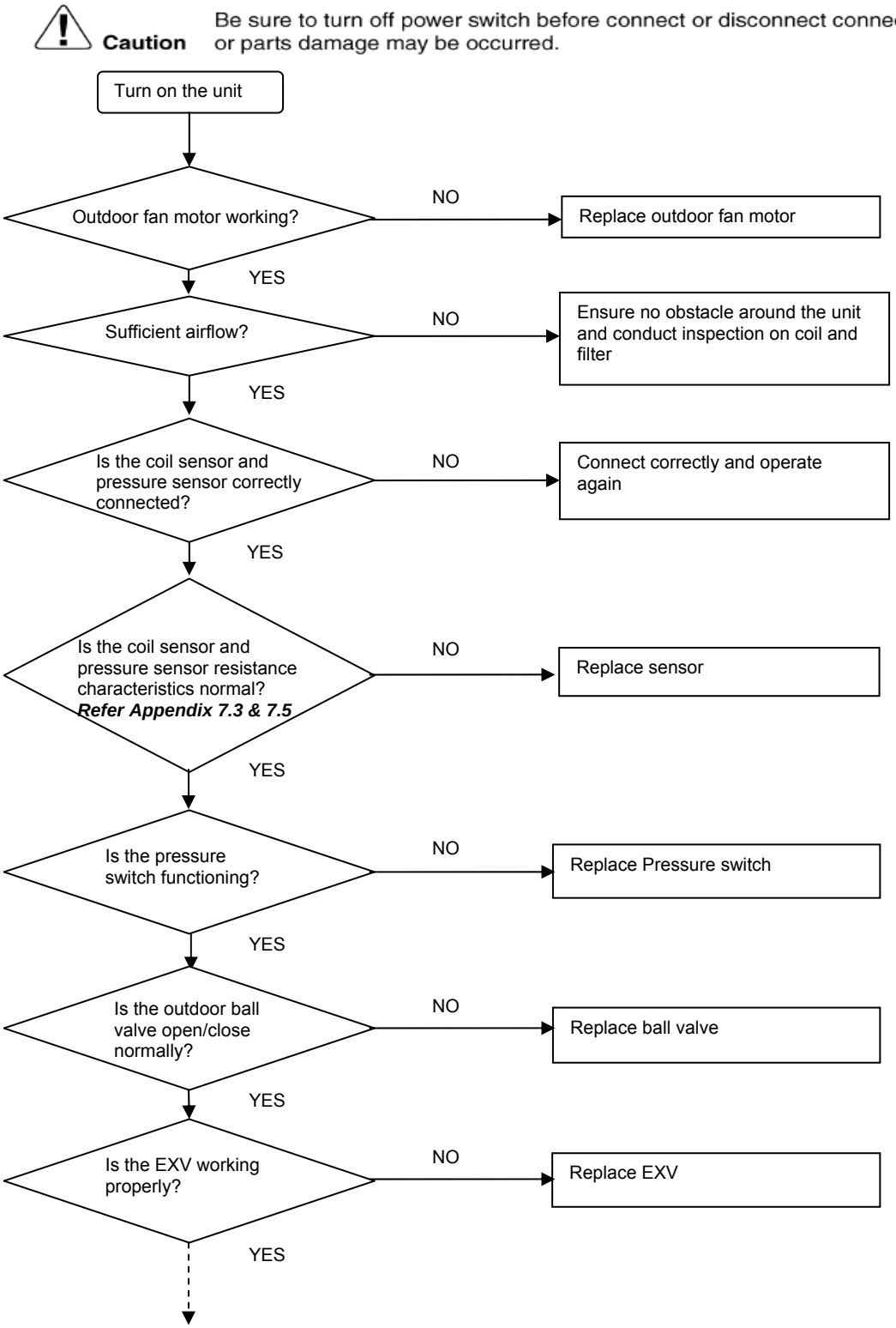
Master unit and slave unit communication error
Error Code: FE (For MC301), ER63 (For MDS-M PCB)

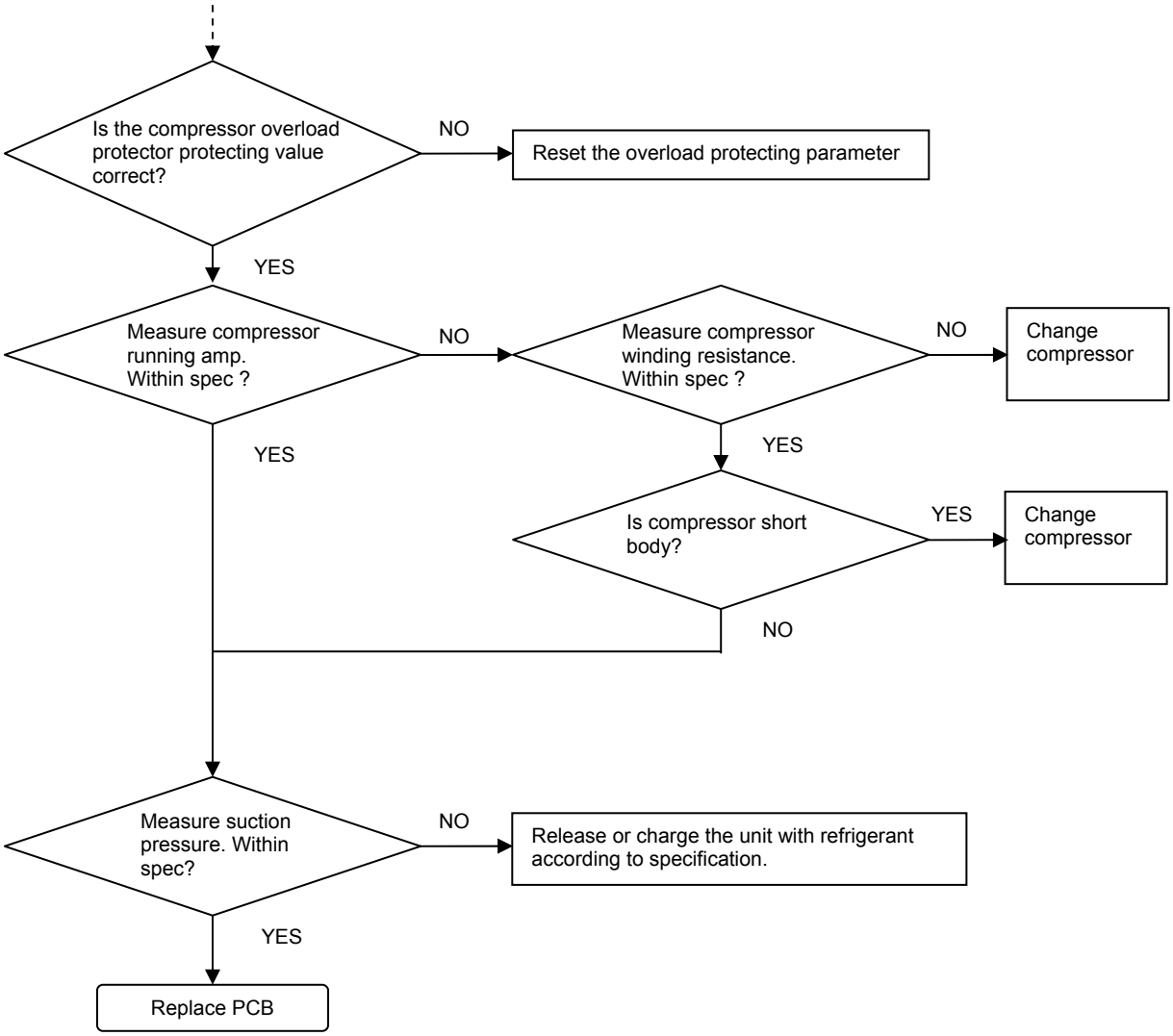
Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



System malfunction error

Error Code: Decorative Error code #8, E0, 10 (For MC301), E8 (For MDOM PCB), ER55 (For MDS-M PCB)

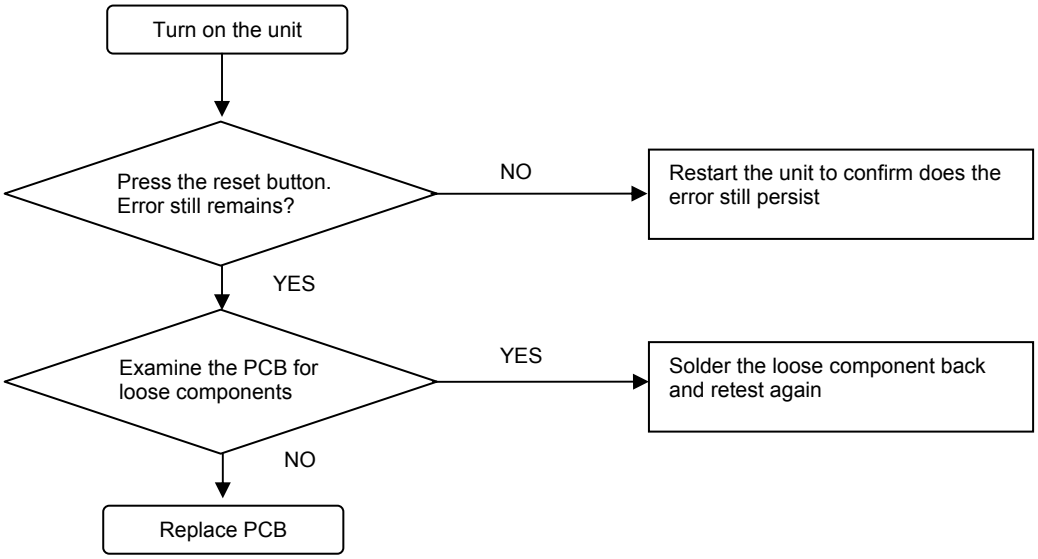



Is the compressor overload protector protecting value correct?
NO
Reset the overload protecting parameter
YES
Measure compressor running amp. Within spec ?
NO
Measure compressor winding resistance. Within spec ?
NO
Change compressor
YES
YES
Is compressor short body?
YES
Change compressor
NO
Measure suction pressure. Within spec?
NO
Release or charge the unit with refrigerant according to specification.
YES
Replace PCB

Outdoor storage malfunction

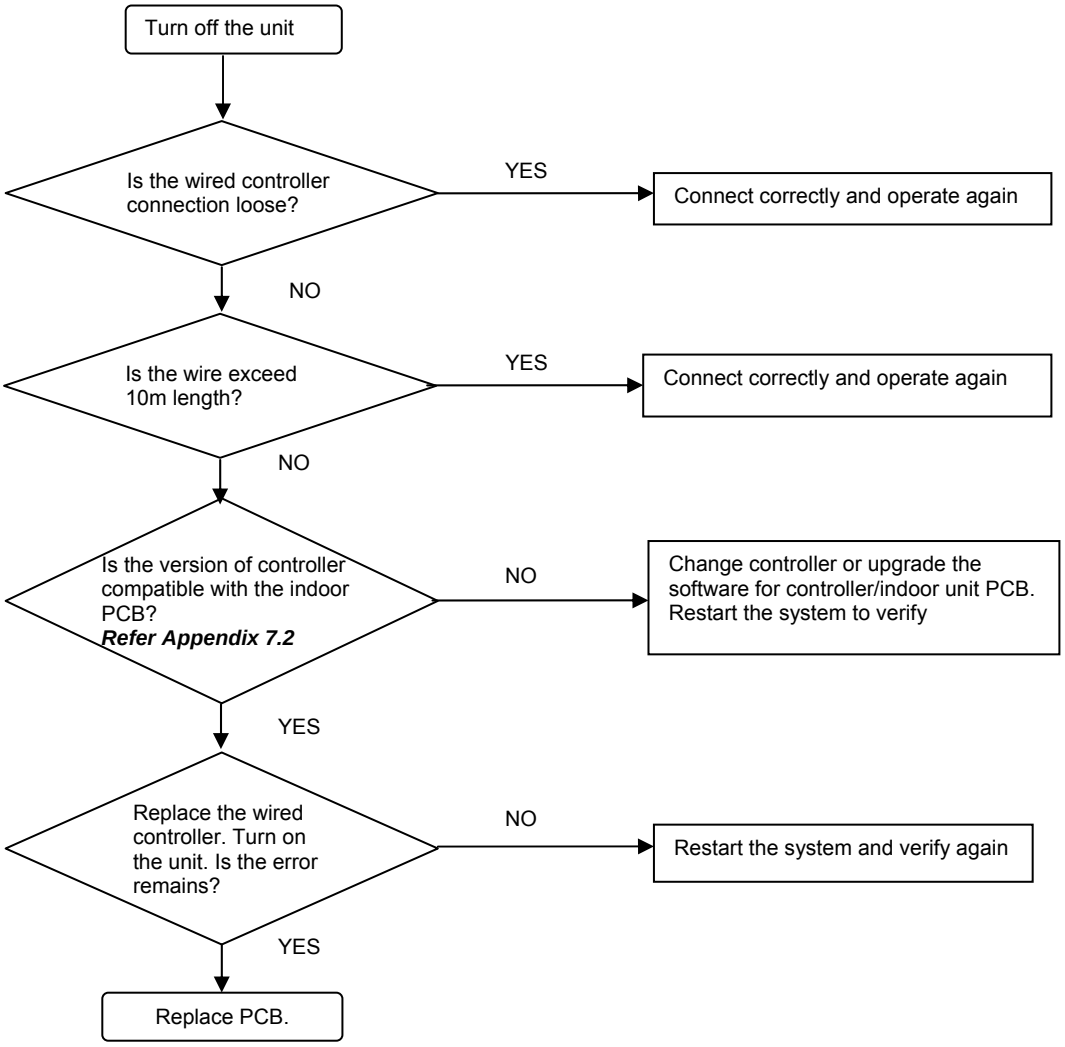
Error Code: F0, 20 (For MC301), ER54 (For MDS-M PCB)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



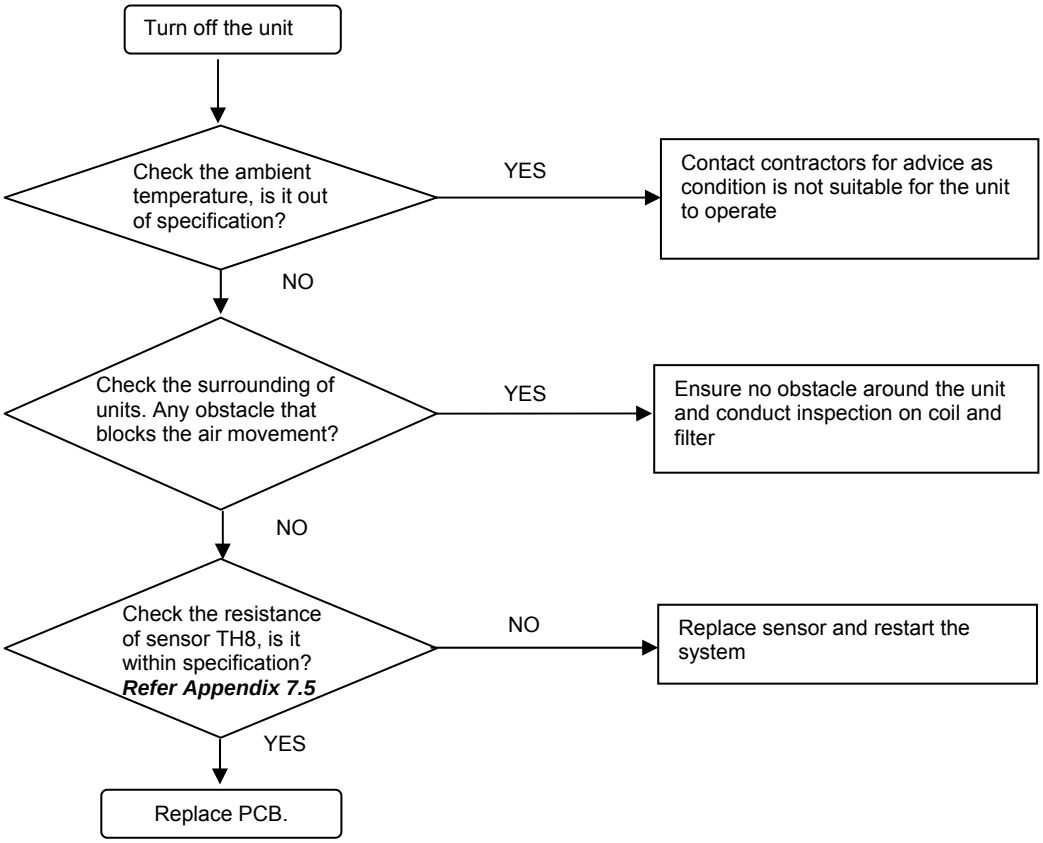
Indoor and controller communication error
Error Code: F6 (For MC301)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



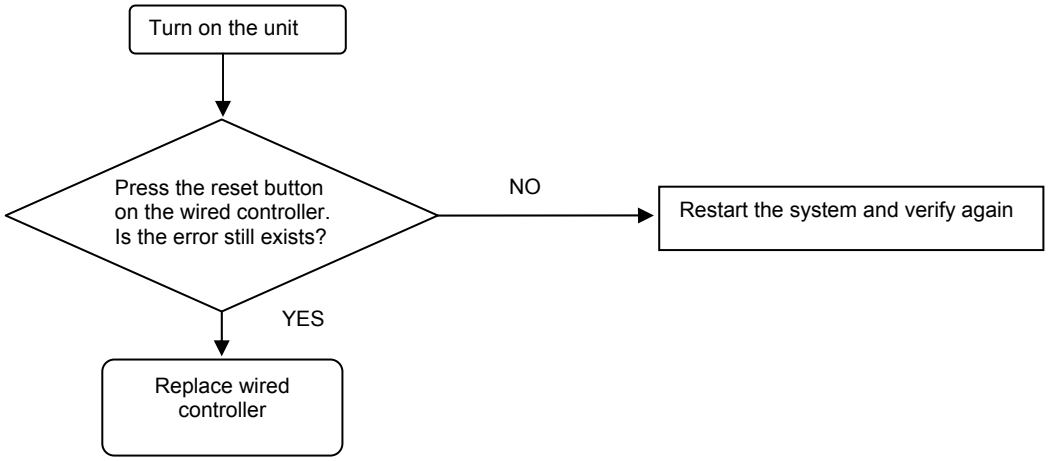
Ambient temperature beyond limit
Error Code: F7, 27 (For MC301), ER59 (For MDS-M PCB)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



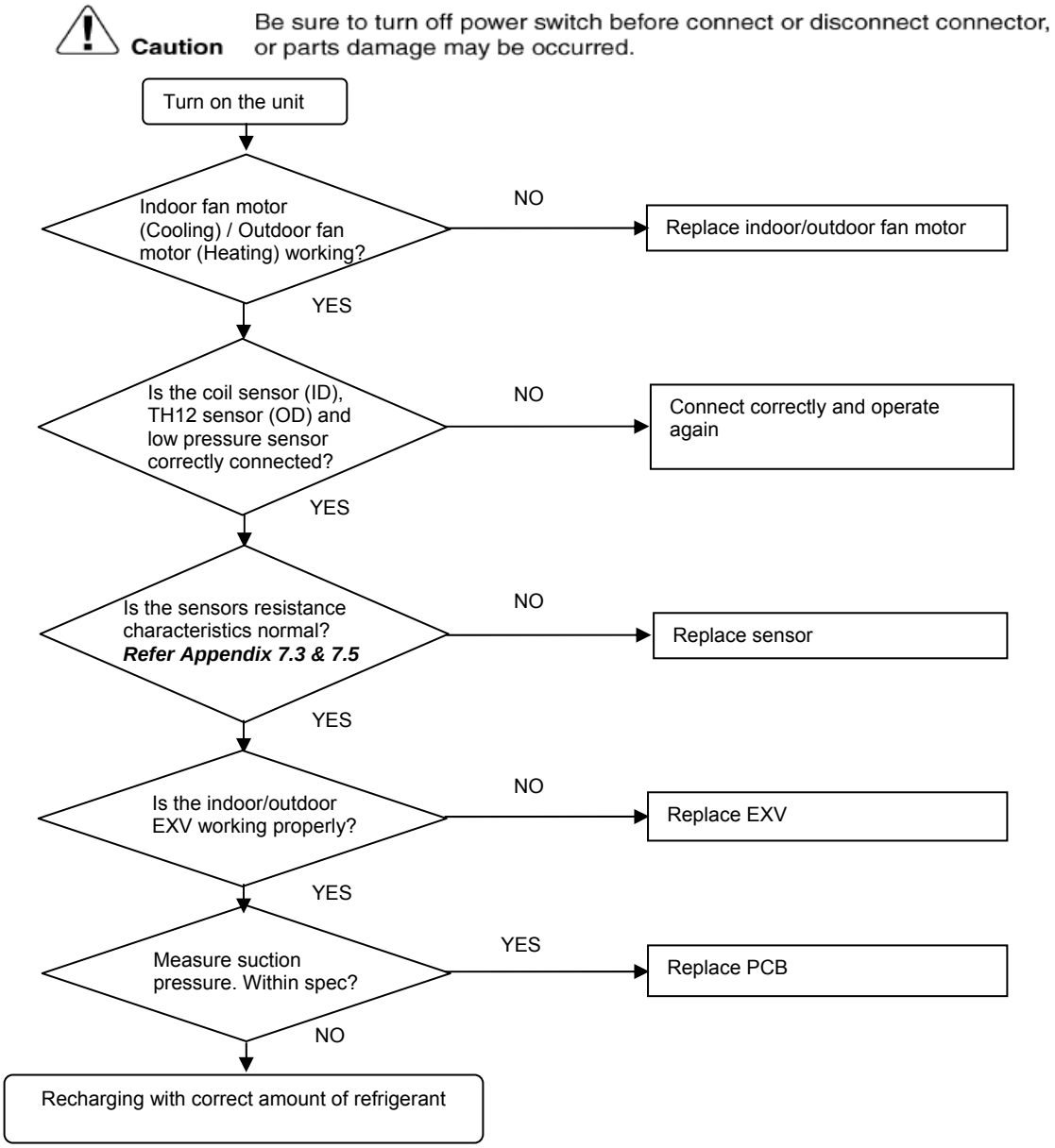
Wired controller storage problem
Error Code: FA (For MC301)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



Superheat protecting value too small

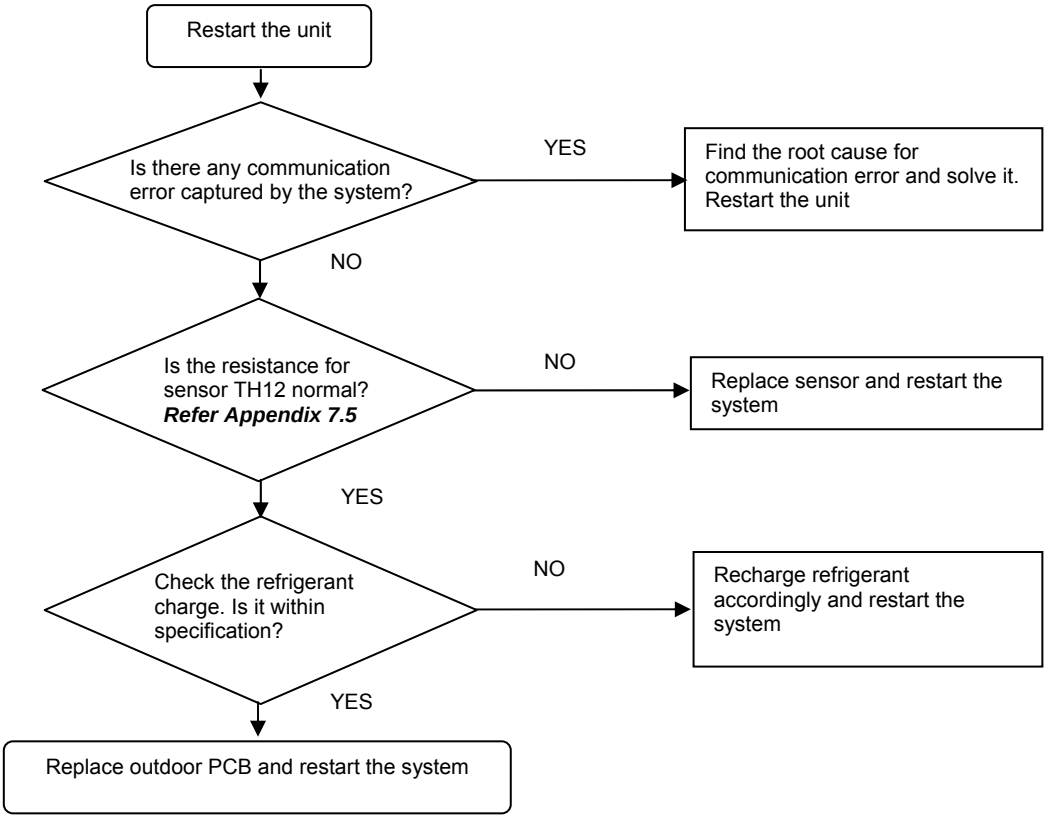
Error Code: L0, 40 (For MC301), ER61 (For MDS-M PCB)



Emergency Run

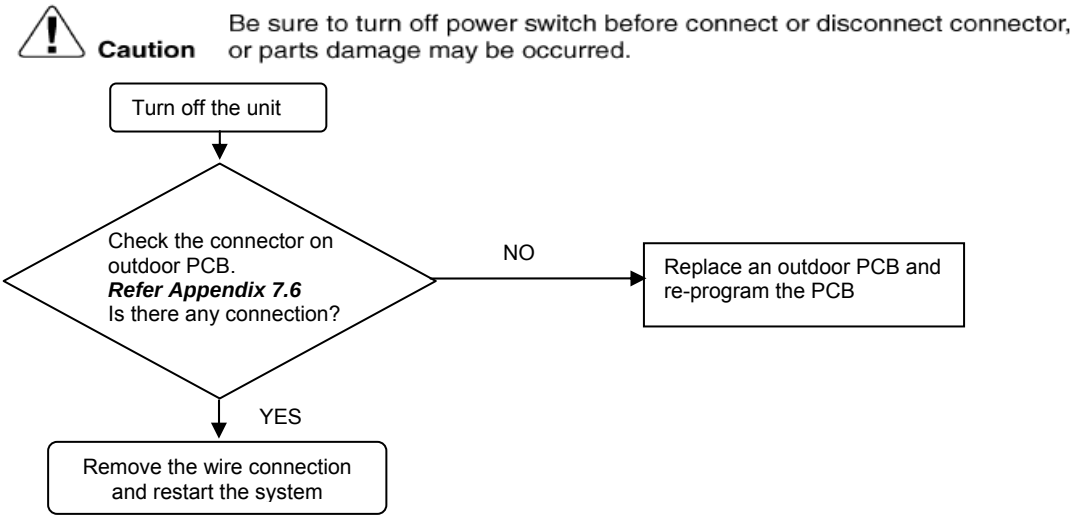
Error Code: EF, 1F (For MC301), ER60 (For MDS-M PCB)

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



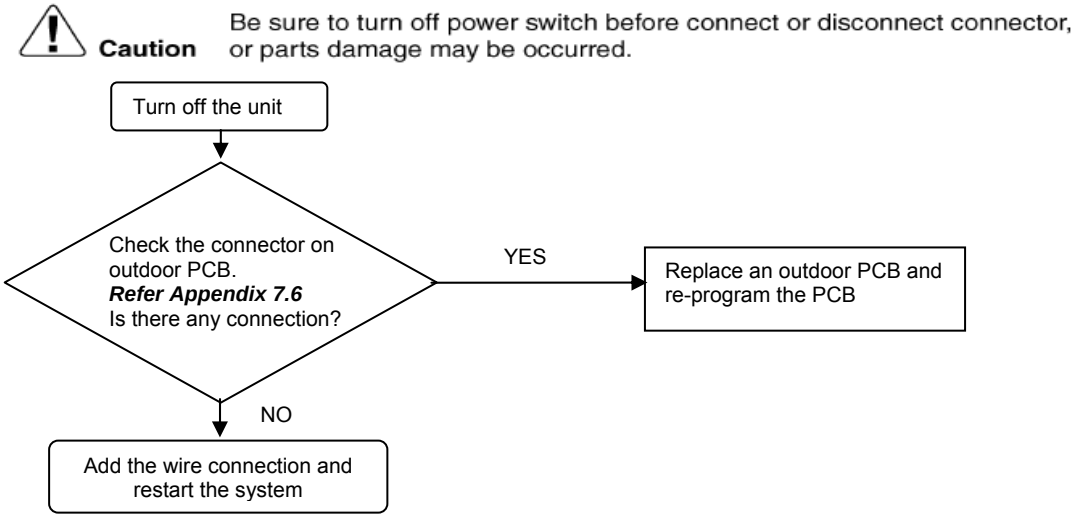
Wrong Hardware and Software combination

Error Code: R22 (For MDS-M PCB)



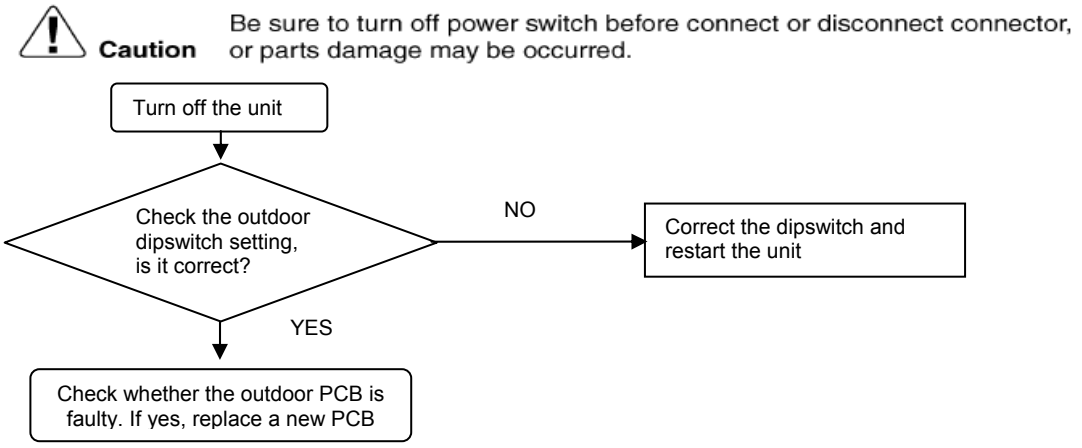
6

Error Code: R410 (For MDS-M PCB)



PCB Setting Error

Error Code: ERSE (For MDS-M PCB)



7.0 Appendix

7.1 Compatibility Chart for Indoor and Outdoor PCB

MDOM PCB (Outdoor) with MC200-C / MC201-C PCB (Indoor)

Indoor Unit \ Outdoor Unit	V2.0	V2.1	V2.2	V2.3	V2.4	V2.5	V2.6	V4.0	V4.1	V4.2	V4.3	V4.4	V4.5
2.0													
2.1													
2.2													
2.3													
2.4													
2.5													

MDS-M PCB (Outdoor) with MC200-C / MC201-C PCB (Indoor)

Indoor PCB \ Outdoor PCB	2..0	2.1	2.2	2.3	2.4	2.5	2.6	2.7
2.0								
2.1								
2.2								
2.3								
2.4								
2.5								
2.6								

MDS-M PCB (R410A Outdoor) with MC200-C / MC201-C PCB (Indoor)

Indoor PCB \ Outdoor PCB	2.1A	2.2A	2.3A	2.4A	2.5A	2.6A
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						

Legend:

Not compatible

Compatible

Remark:
1. Only replace existing PCB with same or newer software version PCB.
2. When replacing outdoor PCB V2.5 and below with V2.6 and above (for R22 MDS-B model), replacing outdoor PCB V4.4 and below with V4.5 and above (for R22 MDS-A model) or replacing outdoor PCB V2.4A and below with V2.5A and above (for R410A model), please check the existing discharge temperature sensor TH1. If the discharge temperature sensor is not from Minjie brand, it should be change to this brand. If it is a master and slave unit, a new Minjie brand discharge temperature sensor need to be added at compressor discharge piping where the piping for master and slave merge.
3. When replacing outdoor PCB V2.3 and below with V2.4 and above (for R22 MDS-B model), outdoor capacity dipswitch setting may be different. Dipswitch setting for PCB V2.4 and above is available in page 50. The table below shows the dipswitch setting for PCB V2.3 and below:

Capacity	S3.1	S3.2	S3.3	S3.4
8HP	0	0	0	0
10HP	0	0	0	1
12HP	0	0	1	0
15HP	0	0	1	1
18HP	0	1	0	0
20HP	0	1	0	1
22HP	0	1	1	0
26HP	0	1	1	1
28HP	1	0	0	0
32HP	1	0	0	1

7.2 Compatibility Chart for Wired Handset MC301

MC301 / Indoor PCB	B1.5	B1.6	B1.7	B1.8	B1.9	B2.0
2.0	■	■	■	■	■	■
2.1	■	■	■	■	■	■
2.2	■	■	■	■	■	■
2.3	■	■	■	■	■	■
2.4	■	■	■	■	■	■
2.5	■	■	■	■	■	■
2.6						■

Legend:
- ☐ Not compatible
- ■ Compatible

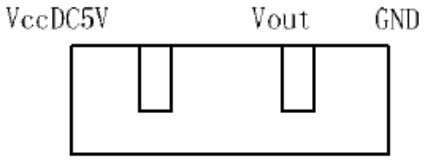
7.3 Pressure Sensor Voltage and Resistance Value

High pressure sensor

HS pressure value (bar)	Vout, GND voltage (V)	Vout,GND resistance (k ohm)	Vout,Vcc resistance (k ohm)
0	0.50	0.47	4.20
1	0.58	0.54	4.12
2	0.65	0.60	4.07
3	0.72	0.67	4.00
4	0.79	0.74	3.93
5	0.87	0.81	3.85
6	0.93	0.87	3.79
7	1.00	0.94	3.73
8	1.09	1.01	3.65
9	1.15	1.06	3.60
10	1.22	1.13	3.53
11	1.30	1.21	3.45
12	1.37	1.27	3.39
13	1.44	1.34	3.32
14	1.51	1.40	3.26
15	1.58	1.47	3.19
16	1.66	1.54	3.12
17	1.73	1.61	3.05
18	1.80	1.68	2.98
19	1.88	1.74	2.92
20	1.95	1.82	2.85
21	2.03	1.88	2.78
22	2.10	1.95	2.71
23	2.17	2.02	2.64
24	2.24	2.09	2.58
25	2.31	2.15	2.51
26	2.38	2.21	2.45
27	2.45	2.28	2.38
28	2.53	2.35	2.30
29	2.61	2.43	2.24
30	2.67	2.48	2.18
31	2.75	2.55	2.11
32	2.82	2.62	2.05
33	2.89	2.69	1.97
34	2.97	2.76	1.90
35	3.04	2.82	1.84
36	3.11	2.88	1.78
37	3.18	2.95	1.71
38	3.25	3.02	1.64
39	3.32	3.09	1.57
40	3.40	3.16	1.50
41	3.47	3.22	1.44

Low pressure sensor

LS pressure value (bar)	Vout, GND voltage (V)	Vout,GND resistance (k ohm)	Vout,Vcc resistance (k ohm)
0	0.50	0.47	4.13
1	0.69	0.63	3.97
2	0.86	0.79	3.81
3	1.04	0.95	3.64
4	1.22	1.12	3.47
5	1.40	1.28	3.32
6	1.57	1.44	3.16
7	1.75	1.60	3.00
8	1.92	1.76	2.84
9	2.11	1.93	2.67
10	2.28	2.09	2.51
11	2.45	2.25	2.35
12	2.64	2.42	2.18
13	2.81	2.57	2.02
14	2.99	2.74	1.86
15	3.16	2.90	1.70
16	3.34	3.06	1.54
17	3.48	3.19	1.41



7.4 Character Reference for 7 Segment LED

Code	Denotation	Code	Denotation	Code	Denotation
0	0 / O	8	8	H	H
1	1	9	9	L	L
2	2	A	A	n	N
3	3	b	B	P	P
4	4	C	C	r	R
5	5	d	D	t	T
6	6	E	E	U	U
7	7	F	F	y	Y

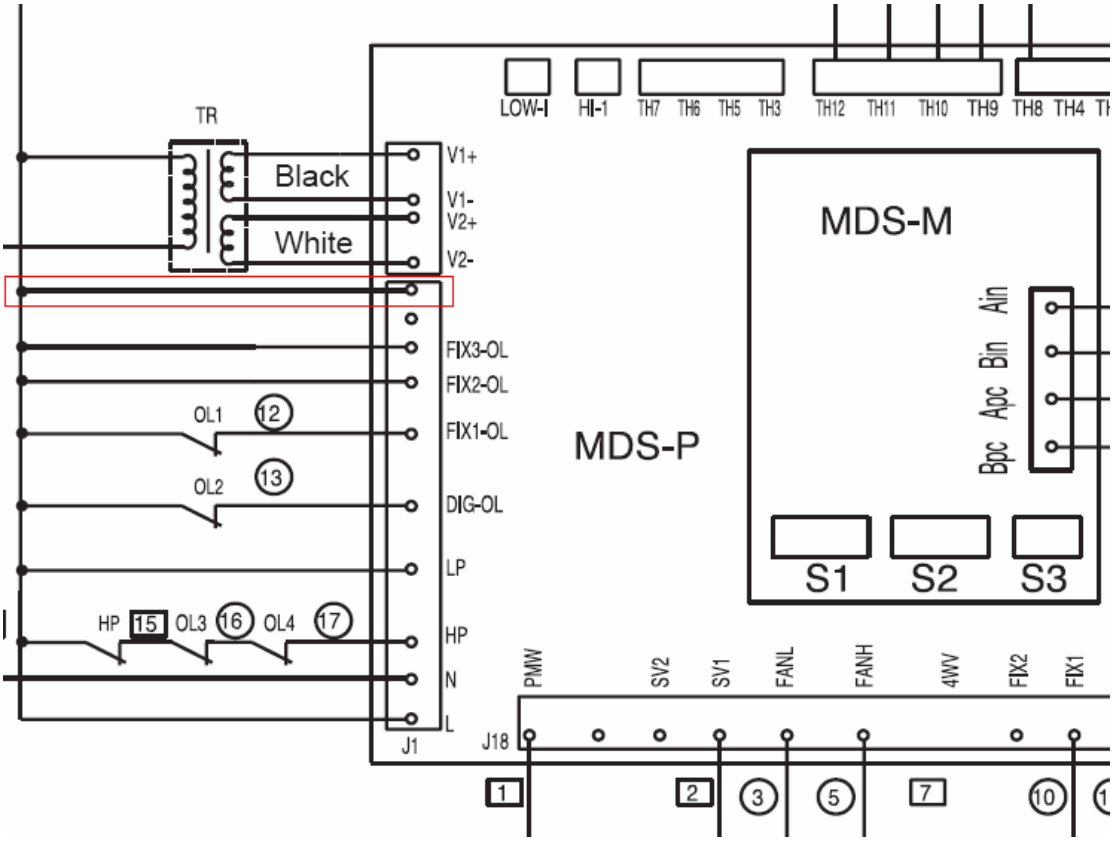
7.5 Temperature Sensor Resistance Value

Remark: Exclude discharge temperature sensor (TH1) and ambient temperature sensor (TH8)
$R_{25°C}$ = 10KΩ ± 1%

T℃	Rmin	Rnom	Rmax	T℃	Rmin	Rnom	Rmax
-40	2.2080E+02	2.3040E+02	2.4030E+02	10	1.8030E+01	1.8312E+01	1.8620E+01
-39	2.0800E+02	2.1690E+02	2.2610E+02	11	1.7290E+01	1.7570E+01	1.7840E+01
-38	1.9600E+02	2.0420E+02	2.2180E+02	12	1.6590E+01	1.6840E+01	1.7100E+01
-37	1.8480E+02	1.9250E+02	2.0040E+02	13	1.5920E+01	1.6160E+01	1.6400E+01
-36	1.7430E+02	1.8140E+02	1.8880E+02	14	1.5280E+01	1.5500E+01	1.5730E+01
-35	1.6450E+02	1.7110E+02	1.7790E+02	15	1.4670E+01	1.4880E+01	1.5090E+01
-34	1.5530E+02	1.6140E+02	1.6780E+02	16	1.4090E+01	1.4280E+01	1.4480E+01
-33	1.4670E+02	1.5240E+02	1.5830E+02	17	1.3530E+01	1.3710E+01	1.3900E+01
-32	1.3860E+02	1.4390E+02	1.4940E+02	18	1.3000E+01	1.3170E+01	1.3340E+01
-31	1.3110E+02	1.3600E+02	1.4110E+02	19	1.2500E+01	1.2650E+01	1.2810E+01
-30	1.2400E+02	1.2850E+02	1.3330E+02	20	1.2020E+01	1.2160E+01	1.2310E+01
-29	1.1730E+02	1.2160E+02	1.2600E+02	21	1.1550E+01	1.1690E+01	1.1820E+01
-28	1.1100E+02	1.1500E+02	1.1910E+02	22	1.1110E+01	1.1240E+01	1.1360E+01
-27	1.0520E+02	1.0880E+02	1.1270E+02	23	1.0690E+01	1.0810E+01	1.0920E+01
-26	9.9620E+01	1.0310E+02	1.0660E+02	24	1.0290E+01	1.0390E+01	1.0500E+01
-25	9.4410E+01	9.7620E+01	1.0090E+02	25	9.9000E+00	1.0000E+01	1.0100E+01
-24	8.9520E+01	9.2500E+01	9.5580E+01	26	9.5230E+00	9.6230E+00	9.7230E+00
-23	8.4910E+01	8.7690E+01	9.0560E+01	27	9.1630E+00	9.2630E+00	9.3630E+00
-22	8.0570E+01	8.3170E+01	8.5840E+01	28	8.8190E+00	8.9180E+00	9.0180E+00
-21	7.6480E+01	7.8900E+01	8.1390E+01	29	8.4890E+00	8.5880E+00	8.6870E+00
-20	7.2630E+01	7.4890E+01	7.7210E+01	30	8.1740E+00	8.2720E+00	8.3710E+00
-19	6.8990E+01	7.1100E+01	7.3260E+01	31	7.8720E+00	7.9700E+00	8.0680E+00
-18	6.5560E+01	6.7530E+01	6.9540E+01	32	7.5830E+00	7.6800E+00	7.7770E+00
-17	6.2320E+01	6.4160E+01	6.6040E+01	33	7.3060E+00	7.4020E+00	7.4990E+00
-16	5.9270E+01	6.0980E+01	6.2740E+01	34	7.0410E+00	7.1360E+00	7.2320E+00
-15	5.6380E+01	5.7980E+01	5.9620E+01	35	6.7870E+00	6.8810E+00	6.9760E+00
-14	5.3660E+01	5.5150E+01	5.6680E+01	36	6.5430E+00	6.6370E+00	6.7310E+00
-13	5.1080E+01	5.2480E+01	5.3910E+01	37	6.3100E+00	6.4020E+00	6.4950E+00
-12	4.8650E+01	4.9950E+01	5.1290E+01	38	6.0860E+00	6.1770E+00	6.2690E+00
-11	4.6350E+01	4.7570E+01	4.8810E+01	39	5.8710E+00	5.9610E+00	6.0520E+00
-10	4.4170E+01	4.5310E+01	4.6470E+01	40	5.6650E+00	5.7540E+00	5.8440E+00
-9	4.2110E+01	4.3170E+01	4.4260E+01	41	5.4680E+00	5.5550E+00	5.6440E+00
-8	4.0160E+01	4.1150E+01	4.2170E+01	42	5.2780E+00	5.3650E+00	5.4520E+00
-7	3.8310E+01	3.9240E+01	4.0190E+01	43	5.0960E+00	5.1820E+00	5.2680E+00
-6	3.6560E+01	3.7430E+01	3.8320E+01	44	4.9210E+00	5.0060E+00	5.0910E+00
-5	3.4900E+01	3.5710E+01	3.6540E+01	45	4.7540E+00	4.8370E+00	4.9210E+00
-4	3.3330E+01	3.4090E+01	3.4860E+01	46	4.5920E+00	4.6740E+00	4.7570E+00
-3	3.1840E+01	3.2550E+01	3.3270E+01	47	4.4380E+00	4.5180E+00	4.6000E+00
-2	3.0420E+01	3.0180E+01	3.1760E+01	48	4.2890E+00	4.3680E+00	4.4490E+00
-1	2.9080E+01	2.9700E+01	3.0330E+01	49	4.1460E+00	4.2240E+00	4.3030E+00
0	2.7800E+01	2.8380E+01	2.8970E+01	50	4.0080E+00	4.0850E+00	4.1630E+00
1	2.6590E+01	2.7130E+01	2.7680E+01	51	3.8760E+00	3.9520E+00	4.0290E+00
2	2.5430E+01	2.5940E+01	2.6540E+01	52	3.7490E+00	3.8230E+00	3.8990E+00
3	2.4340E+01	2.4810E+01	2.5290E+01	53	3.6270E+00	3.7000E+00	3.7740E+00
4	2.3300E+01	2.3740E+01	2.4169E+01	54	3.5090E+00	3.5810E+00	3.6540E+00

5	2.2310E+01	2.2720E+01	2.3140E+01	55	3.3960E+00	3.4670E+00	3.5390E+00
6	2.1360E+01	2.1750E+01	2.2140E+01	56	3.2870E+00	3.3560E+00	3.4270E+00
7	2.0470E+01	2.0830E+01	2.1190E+01	57	3.1280E+00	3.2500E+00	3.3200E+00
8	1.9610E+01	1.9950E+01	2.0290E+01	58	3.0810E+00	3.1480E+00	3.2160E+00
9	1.8800E+01	1.9120E+01	1.9244E+01	59	2.9840E+00	3.0500E+00	3.1170E+00

7.6 Hardware Configuration for 5MDS Outdoor



Remark: The marked wire should be connected only for R410A MDS model on outdoor MDS-M PCB.

7.7 R22 MDS-A Series Cooling Cycle Reference

Item \ Model				030		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	015 | 020	015 | 020	015 | 020
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	2.6	2.6	2.6
Outdoor Unit	Total Current		A	13.0	20.0	21.0
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	150 | 150	250 | 250	400 | 400
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	11.5	19	25
	Low Pressure			4.1	4.2	5.2
Temp	Outdoor Unit	Discharge (TH1)	°C	60.0	95.0	98.0
		Suction (TH12)		10.0	15.0	15.0
		Compressor Bottom		45.0	60.0	65.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item \ Model				040		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	4	4	4
		Quantity in Operation		4	4	4
		Model	-	010 | 010 | 010 | 010	010 | 010 | 010 | 010	010 | 010 | 010 | 010
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.7	4.7	4.7
Outdoor Unit	Total Current		A	12.5	19.0	20.5
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	150 | 150 | 150 | 150	250 | 250 | 250 | 250	400 | 400 | 400 | 400
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	11.0	17.5	23.0
	Low Pressure			4.8	5.0	6.5
Temp	Outdoor Unit	Discharge (TH1)	°C	65.0	85.0	97.0
		Suction (TH12)		12.0	17.0	25.0
		Compressor Bottom		55.0	85.0	75.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item			Model	050		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	025 | 025	025 | 025	025 | 025
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.7 / 4.9	4.7 / 4.9	4.7 / 4.9
Outdoor Unit	Total Current		A	13.0 / 5.5	24.5 / 8.5	26.0 / 9.5
	Volts		V	220 / 380	220 / 380	220 / 380
EXV Opening	Indoor Unit		STEP	150 | 150	250 | 250	350 | 350
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	11.0	18.0	24.0
	Low Pressure			4.6	4.9	6.5
Temp	Outdoor Unit	Discharge (TH1)	°C	70.0	90.0	100.0
		Suction (TH12)		12.0	15.0	20.0
		Compressor Bottom		45.0	55.0	65.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item			Model	060		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	020 | 040	020 | 040	020 | 040
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	5.0	5.0	5.0
Outdoor Unit	Total Current		A	7.5	11.0	12.0
	Volts		V	380	380	380
EXV Opening	Indoor Unit		STEP	150 | 150	250 | 250	300 | 300
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	10.5	18.0	24.0
	Low Pressure			4.4	4.6	6.2
Temp	Outdoor Unit	Discharge (TH1)	°C	65.0	90.0	98.0
		Suction (TH12)		10.0	12.0	18.0
		Compressor Bottom		45.0	55.0	70.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item \ Model				070											
Condition	Ambient Temp	Indoor	DB / WB	21/15				27/19				32/23			
		Outdoor		18				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity in Operation		4				4				4			
		Model	-	015	015	020	020	015	015	020	020	015	015	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	5.5				5.5				5.5			
Outdoor Unit	Total Current		A	9.5				11.5				14.0			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	150	150	150	150	250	250	250	250	400	400	350	350
	S.C (EXV4)			-				-				-			
Pressure	High Pressure		Bar	16.0				18.5				25.0			
	Low Pressure			4.2				5.0				6.0			
Temp	Outdoor Unit	Discharge (TH1)	°C	74.0				90.0				98.0			
		Suction (TH12)		12.0				16.0				16.0			
		Compressor Bottom		40.0				55.0				65.0			
	Indoor Unit	Coil In (Ti)		6.5				10.0				15.5			
		Coil Mid (Tm)		7.0				10.0				16.0			
		Coil Out (To)		7.5				10.5				17.5			

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7.8 R22 MDS B Series Cooling Cycle Reference

Item \ Model (MDS B/BR)				080											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.5				10.5				10.5			
Outdoor Unit	Total Current		A	11.0				14.6				18.6			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	120	120	120	120	158	158	158	158	174	174	174	174
	S.C(EXV4)			102				110				115			
Pressure	High Pressure		bar	15.1				18.4				21.6			
	Low Pressure			3.8				4.7				5.1			
Temp.	Outdoor Unit	Discharge(TH1)	°C	81.3				95.3				103.3			
		S.C Inlet(TH9)		30.0				42.0				49.0			
		S.C Outlet(TH10)		15.0				29.0				38.0			
		S.C Bypass Outlet(TH11)		29.2				41.2				48.2			
		Suction(TH12)		12.5				15.8				17.0			
		Compressor Bottom		37.7				43.0				46.2			
	Indoor Unit	Coil In(Ti)		5.0				8.3				9.5			
		Coil Mid(Tm)		4.7				8.0				9.2			
		Coil Out(To)		5.3				8.6				9.9			

Item			Model (MDS B/BR)	100											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	025	030	025	030	025	030	025	030	025	030	025	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.0				12.0				12.0			
Outdoor Unit	Total Current		A	12.7				16.8				21.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	160	113	160	113	198	151	198	151	214	167	214	167
	S.C(EXV4)			120				128				133			
Pressure	High Pressure		bar	15.0				18.4				21.5			
	Low Pressure			4.1				5.0				5.4			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	79.2				93.2				101.2			
		S.C Inlet(TH9)		31.5				43.5				51.5			
		S.C Outlet(TH10)		17.1				31.1				40.1			
		S.C Bypass Outlet(TH11)		27.7				39.7				47.7			
		Suction(TH12)		12.4				15.7				16.9			
		Compressor Bottom		36.7				42.0				45.2			
	Indoor Unit	Coil In(Ti)		6.4				9.7				10.9			
		Coil Mid(Tm)		6.7				10.0				11.2			
		Coil Out(To)		7.3				10.6				11.8			

Item			Model (MDS B/BR)	120											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	030	030	030	030	030	030	030	030	030	030	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	15.0				15.0				15.0			
Outdoor Unit	Total Current		A	14.2				18.8				24.0			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	113	113	113	113	151	151	151	151	167	167	167	167
	S.C(EXV4)			153				161				166			
Pressure	High Pressure		bar	16.1				19.5				22.7			
	Low Pressure			3.7				4.6				5.0			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	84.0				98.0				106.0			
		S.C Inlet(TH9)		27.6				39.6				47.6			
		S.C Outlet(TH10)		9.5				23.5				32.5			
		S.C Bypass Outlet(TH11)		24.5				36.5				44.5			
		Suction(TH12)		11.8				15.1				16.3			
		Compressor Bottom		49.4				54.7				57.9			
	Indoor Unit	Coil In(Ti)		6.3				9.6				10.8			
		Coil Mid(Tm)		6.0				9.3				10.5			
		Coil Out(To)		6.8				10.1				11.3			

Item \ Model (MDS B/BR)				150											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	040	040	040	030	040	040	040	030	040	040	040
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	17.4				23.1				29.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	113	156	156	156	151	194	194	194	167	210	210	210
	S.C(EXV4)			135				143				148			
Pressure	High Pressure		bar	15.6				19.0				22.2			
	Low Pressure			4.2				5.1				5.5			
Temp.	Outdoor Unit	Discharge(TH1)	°C	78.3				92.3				100.3			
		S.C Inlet(TH9)		31.1				43.1				51.1			
		S.C Outlet(TH10)		16.9				30.9				39.9			
		S.C Bypass Outlet(TH11)		27.2				39.2				47.2			
		Suction(TH12)		12.4				15.7				16.9			
		Compressor Bottom		36.3				41.6				44.8			
	Indoor Unit	Coil In(Ti)		6.3				9.6				10.8			
		Coil Mid(Tm)		6.6				9.9				11.1			
		Coil Out(To)		7.2				10.5				11.7			

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Item \ Model (MDS B/BR)				180											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	040	050	040	050	040	050	040	050	040	050	040	050
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	25.0				25.0				25.0			
Outdoor Unit	Total Current		A	21.3				28.2				36.0			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	156	201	156	201	194	239	194	239	210	255	210	255
	S.C(EXV4)			150				158				163			
Pressure	High Pressure		bar	14.2				17.6				20.8			
	Low Pressure			3.8				4.7				5.1			
Temp.	Outdoor Unit	Discharge(TH1)	°C	79.2				93.2				101.2			
		S.C Inlet(TH9)		30.0				42.0				50.0			
		S.C Outlet(TH10)		17.4				31.4				40.4			
		S.C Bypass Outlet(TH11)		27.2				39.2				47.2			
		Suction(TH12)		12.2				15.5				16.7			
		Compressor Bottom		35.7				41.0				44.2			
	Indoor Unit	Coil In(Ti)		6.1				9.4				10.6			
		Coil Mid(Tm)		6.2				9.5				10.7			
		Coil Out(To)		6.5				9.8				11.0			

Item			Model (MDS B/BR)	200											
Condition	Ambient Temp.	Indoor	DB/ WB	21/19				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	31.0				31.0				31.0			
Outdoor Unit	Total Current		A	23.5				31.1				39.7			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	201	201	201	201	239	239	239	239	255	255	255	255
	S.C(EXV4)			160				168				173			
Pressure	High Pressure		bar	14.2				17.6				20.8			
	Low Pressure			2.8				4.3				4.9			
Temp.	Outdoor Unit	Discharge(TH1)	°C	81.1				95.1				103.1			
		S.C Inlet(TH9)		30.7				42.7				50.7			
		S.C Outlet(TH10)		17.7				31.7				40.7			
		S.C Bypass Outlet(TH11)		20.6				32.6				40.6			
		Suction(TH12)		8.1				13.4				15.4			
		Compressor Bottom		25.1				32.4				36.4			
	Indoor Unit	Coil In(Ti)		4.6				9.9				11.9			
		Coil Mid(Tm)		4.7				10.0				12.0			
		Coil Out(To)		4.9				10.2				12.2			

Item			Model (MDS B/BR)	220											
Condition	Ambient Temp.	Indoor	DB/ WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	37.0				37.0				37.0			
Outdoor Unit	Total Current		A	24.7				32.7				41.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	201	201	250	250	239	239	288	288	255	255	304	304
	S.C(EXV4)			170				178				183			
Pressure	High Pressure		bar	22.2				27.6				32.7			
	Low Pressure			2.8				4.3				4.9			
Temp.	Outdoor Unit	Discharge(TH1)	°C	81.7				95.7				103.7			
		S.C Inlet(TH9)		30.2				42.2				50.2			
		S.C Outlet(TH10)		16.1				30.1				39.1			
		S.C Bypass Outlet(TH11)		21.7				33.7				41.7			
		Suction(TH12)		7.9				13.2				15.2			
		Compressor Bottom		41.3				48.6				52.6			
	Indoor Unit	Coil In(Ti)		4.4				9.7				11.7			
		Coil Mid(Tm)		4.6				9.9				11.9			
		Coil Out(To)		4.7				10.0				12.0			

Item \ Model (MDS B/BR)				240											
Condition	Ambient Temp.	Indoor	DB/ WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	43.0				43.0				43.0			
Outdoor Unit	Total Current		A	29.1				38.5				49.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	250	250	250	250	288	288	288	288	304	304	304	304
	S.C(EXV4)			180				188				193			
Pressure	High Pressure		bar	12.5				17.9				23.0			
	Low Pressure			2.7				4.2				4.8			
Temp.	Outdoor Unit	Discharge(TH1)	°C	81.0				95.0				103.0			
		S.C Inlet(TH9)		31.1				43.1				51.1			
		S.C Outlet(TH10)		16.9				30.9				39.9			
		S.C Bypass Outlet(TH11)		23.5				35.5				43.5			
		Suction(TH12)		8.3				13.6				15.6			
		Compressor Bottom		42.2				49.5				53.5			
	Indoor Unit	Coil In(Ti)		4.5				9.8				11.8			
		Coil Mid(Tm)		4.6				9.9				11.9			
		Coil Out(To)		4.8				10.1				12.1			

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7.9 R22 MDS A Series Heating Cycle Reference

Item \ Model				030				
Condition	Ambient Temp	Indoor	DB / WB	20/15		20/19		27/19
		Outdoor		-9		7/6		21/15
	Indoor Unit	Quantity	PC	2		2		2
		Quantity in Operation		2		2		2
		Model	-	015	020	015	020	015 020
	Piping	Main Pipe	m	5		5		5
		Branch Pipe		5		5		5
		Total Piping Length		22		22		22
	Refrigerant Volume		kg	2.6		2.6		2.6
Outdoor Unit	Total Current		A	13.0		20.0		21.0
	Volts		V	220		220		220
EXV Opening	Indoor Unit		STEP	450	400	450	400	450 400
	EXV 1			150		300		350
Pressure	High Pressure		Bar	13.5		16.5		16.7
	Low Pressure			1.5		3.0		5.5
Temp	Outdoor Unit	Discharge (TH1)	°C	80.0		85.0		82.0
		Suction (TH12)		-17.0		3.0		14.6
		Compressor Bottom		40.0		50.0		65.0
	Indoor Unit	Coil In (Ti)		34.0		40.0		40.0
		Coil Mid (Tm)		35.5		45.0		45.0
		Coil Out (To)		65.0		75.0		75.0

Item			Model	040											
Condition	Ambient Temp	Indoor	DB / WB	20/15				20/16				27/19			
		Outdoor		-9				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity in Operation		4				4				4			
		Model	-	010	010	010	010	010	010	010	010	010	010	010	010
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	4.7				4.7				4.7			
Outdoor Unit	Total Current		A	15.0				16.5				12.5			
	Volts		V	220				220				220			
EXV Opening	Indoor Unit		STEP	450	450	450	450	450	450	450	450	450	450	450	450
	EXV 1			170				250				200			
Pressure	High Pressure		Bar	11.5				14.0				14.0			
	Low Pressure			1.8				3.4				5.5			
Temp	Outdoor Unit	Discharge (TH1)	°C	50.0				70.0				75.0			
		Suction (TH12)		-16.3				4.0				17.0			
		Compressor Bottom		21.5				42.0				54.0			
	Indoor Unit	Coil In (Ti)		28.0				34.0				38.0			
		Coil Mid (Tm)		30.0				38.0				40.0			
		Coil Out (To)		50.0				65.0				70.0			

Item			Model	050						
Condition	Ambient Temp	Indoor	DB / WB	20/15		20/15		27/19		
		Outdoor		-9		7/6		21/15		
	Indoor Unit	Quantity	PC	2		2		2		
		Quantity in Operation		2		2		2		
		Model	-	025	025	025	025	025	025	
	Piping	Main Pipe	m	5		5		5		
		Branch Pipe		5		5		5		
		Total Piping Length		22		22		22		
	Refrigerant Volume		kg	4.7 / 4.9		4.7 / 4.9		4.7 / 4.9		
Outdoor Unit	Total Current		A	18.0 / 6.5		20.5 / 7.5		18.0 / 6.5		
	Volts		V	220 / 380		220 / 380		220 / 380		
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	
	EXV 1			150		250		200		
Pressure	High Pressure		Bar	12.0		14.7		15.0		
	Low Pressure			1.8		3.5		5.3		
Temp	Outdoor Unit	Discharge (TH1)	°C	80.0		80.0		85.0		
		Suction (TH12)		-10.0		4.0		12.0		
		Compressor Bottom		12.0		35.0		45.0		
	Indoor Unit	Coil In (Ti)		31.0		36.0		39.0		
		Coil Mid (Tm)		32.0		39.0		41.0		
		Coil Out (To)		60.0		70.0		72.0		

Item			Model	060		
Condition	Ambient Temp	Indoor	DB / WB	21/15	21/15	27/23
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	020 | 040	020 | 040	020 | 040
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	5.0	5.0	5.0
Outdoor Unit	Total Current		A	7.5	8.5	9.5
	Volts		V	380	380	380
EXV Opening	Indoor Unit		STEP	400 | 400	400 | 400	400 | 400
	EXV 1			150	250	250
Pressure	High Pressure		Bar	12.5	16.5	16.0
	Low Pressure			1.8	3.4	5.8
Temp	Outdoor Unit	Discharge (TH1)	°C	58.0	80.0	83.0
		Suction (TH12)		-14.0	4.0	15.0
		Compressor Bottom		10.0	40.0	55.0
	Indoor Unit	Coil In (Ti)		28.0	36.0	39.0
		Coil Mid (Tm)		30.0	39.0	41.0
		Coil Out (To)		52.0	70.0	72.0

Item			Model	070		
Condition	Ambient Temp	Indoor	DB / WB	20/15	20/15	27/19
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	4	4	4
		Quantity in Operation		4	4	4
		Model	-	015 | 015 | 020 | 020	015 | 015 | 020 | 020	015 | 015 | 020 | 020
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	5.5	5.5	5.5
Outdoor Unit	Total Current		A	9.5	10.5	12.5
	Volts		V	380	380	380
EXV Opening	Indoor Unit		STEP	450 | 450 | 400 | 400	450 | 450 | 400 | 400	450 | 450 | 400 | 400
	EXV 1			150	250	258
Pressure	High Pressure		Bar	12.1	15.5	19.7
	Low Pressure			1.8	3.4	6.6
Temp	Outdoor Unit	Discharge (TH1)	°C	75.0	85.0	95.0
		Suction (TH12)		-14.0	6.0	13.0
		Compressor Bottom		20.0	40.0	53.0
	Indoor Unit	Coil In (Ti)		24.0	39.0	40.0
		Coil Mid (Tm)		25.5	42.0	50.0
		Coil Out (To)		58.0	70.0	85.0

7.10 R22 MDS B Series Heating Cycle Reference

Item \ Model (MDS B/BR)				080											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.5				10.5				10.5			
Outdoor Unit	Total Current		A	11.7				13.6				9.3			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	350	350	350	350	350	350	350
	S.C(EXV4)			167				149				111			
Pressure	High Pressure		bar	12.0				15.6				16.0			
	Low Pressure			2.0				3.3				4.8			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	70.1				81.6				57.1			
		S.C Inlet(TH9)		22.6				23.3				30.1			
		S.C Outlet(TH10)		23.3				26.2				33.0			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-8.3				3.9				10.5			
		Compressor Bottom		19.8				29.2				37.8			
	Indoor Unit	Coil In(Ti)		29.3				29.8				35.9			
		Coil Mid(Tm)		33.7				41.5				42.1			
		Coil Out(To)		59.6				70.1				64.1			

Item \ Model(MDS B/BR)				100											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	025	030	025	030	025	030	025	030	025	030	025	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.0				12.0				12.0			
Outdoor Unit	Total Current		A	13.5				15.7				10.7			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	350	350	350	350	350	350	350
	S.C(EXV4)			206				184				136			
Pressure	High Pressure		bar	11.9				17.7				18.3			
	Low Pressure			1.5				3.6				5.9			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	75.5				87.0				62.5			
		S.C Inlet(TH9)		22.8				23.5				30.3			
		S.C Outlet(TH10)		24.0				26.9				33.7			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-10.8				4.2				13.8			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		29.9				30.7				37.1			
		Coil Mid(Tm)		30.6				43.1				44.0			
		Coil Out(To)		55.5				72.3				66.5			

Item			Model(MDS B/BR)	120											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	030	030	030	030	030	030	030	030	030	030	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	15.0				15.0				15.0			
Outdoor Unit	Total Current		A	14.4				16.7				11.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	350	350	350	350	350	350	350
	S.C(EXV4)			248				222				164			
Pressure	High Pressure		bar	11.5				17.2				17.8			
	Low Pressure			1.2				3.3				5.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	66.0				77.5				53.0			
		S.C Inlet(TH9)		22.7				23.4				30.2			
		S.C Outlet(TH10)		23.7				26.6				33.4			
		S.C Bypass Outlet(TH11)		18.4				22.0				30.1			
		Suction(TH12)		-11.0				4.0				13.6			
		Compressor Bottom		18.8				31.0				42.6			
	Indoor Unit	Coil In(Ti)		29.4				30.2				36.6			
		Coil Mid(Tm)		29.1				41.6				42.5			
		Coil Out(To)		53.1				69.9				64.1			

Item			Model(MDS B/BR)	150											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	040	040	040	030	040	040	040	030	040	040	040
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	19.4				22.6				15.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	400	400	400	350	400	400	400
	S.C(EXV4)			288				257				190			
Pressure	High Pressure		bar	9.8				15.5				16.1			
	Low Pressure			1.2				3.3				5.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	69.0				80.5				56.0			
		S.C Inlet(TH9)		22.5				23.2				30.0			
		S.C Outlet(TH10)		23.9				26.9				33.7			
		S.C Bypass Outlet(TH11)		18.6				22.2				30.3			
		Suction(TH12)		-11.1				3.9				13.5			
		Compressor Bottom		19.1				31.3				42.9			
	Indoor Unit	Coil In(Ti)		29.7				30.5				36.9			
		Coil Mid(Tm)		29.5				42.0				42.9			
		Coil Out(To)		53.8				70.6				64.8			

Item			Model(MDS B/BR)	180											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	040	050	040	050	040	050	040	050	040	050	040	050
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	25.0				25.0				25.0			
Outdoor Unit	Total Current		A	23.3				27.1				18.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			202				180				133			
Pressure	High Pressure		bar	12.3				18.0				18.6			
	Low Pressure			1.4				3.5				5.8			
Temp.	Outdoor Unit	Discharge(TH1)	°C	78.8				90.3				65.8			
		S.C Inlet(TH9)		24.3				25.0				31.8			
		S.C Outlet(TH10)		24.8				27.7				34.5			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-11.8				3.2				12.8			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		30.5				31.3				37.7			
		Coil Mid(Tm)		30.7				43.2				44.1			
		Coil Out(To)		61.7				78.5				72.7			

Item			Model(MDS B/BR)	200											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	31.0				31.0				31.0			
Outdoor Unit	Total Current		A	25.3				29.4				20.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			231				206				152			
Pressure	High Pressure		bar	12.1				17.8				18.4			
	Low Pressure			1.2				3.4				5.7			
Temp.	Outdoor Unit	Discharge(TH1)	°C	70.5				82.0				57.5			
		S.C Inlet(TH9)		23.1				23.8				30.6			
		S.C Outlet(TH10)		24.2				27.1				33.9			
		S.C Bypass Outlet(TH11)		18.8				22.4				30.5			
		Suction(TH12)		-10.9				4.1				13.7			
		Compressor Bottom		19.3				31.6				43.2			
	Indoor Unit	Coil In(Ti)		29.9				30.7				37.1			
		Coil Mid(Tm)		29.8				42.3				43.3			
		Coil Out(To)		56.3				73.1				67.3			

Item			Model(MDS B/BR)	220											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	37.0				37.0				37.0			
Outdoor Unit	Total Current		A	26.7				31.0				21.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			270				241				178			
Pressure	High Pressure		bar	13.0				18.7				19.3			
	Low Pressure			1.5				3.6				5.9			
Temp.	Outdoor Unit	Discharge(TH1)	°C	81.5				93.0				68.5			
		S.C Inlet(TH9)		22.8				23.5				30.3			
		S.C Outlet(TH10)		23.8				26.8				33.6			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-11.0				4.0				13.6			
		Compressor Bottom		19.0				31.2				42.8			
	Indoor Unit	Coil In(Ti)		29.6				30.4				36.8			
		Coil Mid(Tm)		31.3				43.8				44.8			
		Coil Out(To)		61.5				78.3				72.6			

Item			Model(MDS B/BR)	240											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	43.0				43.0				43.0			
Outdoor Unit	Total Current		A	29.1				33.8				23.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			322				288				213			
Pressure	High Pressure		bar	11.8				17.6				18.2			
	Low Pressure			1.1				3.3				5.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	65.4				76.9				52.4			
		S.C Inlet(TH9)		22.5				23.2				30.0			
		S.C Outlet(TH10)		23.5				26.4				33.2			
		S.C Bypass Outlet(TH11)		18.2				21.8				29.9			
		Suction(TH12)		-11.1				4.0				13.6			
		Compressor Bottom		18.5				30.8				42.4			
	Indoor Unit	Coil In(Ti)		29.2				30.0				36.4			
		Coil Mid(Tm)		29.7				42.3				43.2			
		Coil Out(To)		54.5				71.3				65.6			

For Master & Slave Combination (MDS260-320BR), please refer to the base model for reference.
Example: MDS260BR, please refer to MDS120BR (Master) and MDS150BR (Slave) as reference

7.11 R410A MDS B Series Cooling Cycle Reference

Item \ Model(MDS B/BR)				050		
Condition	Ambient Temp.	Indoor	DB/WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity In Operation		2	2	2
		Model	-	020 | 032	020 | 032	020 | 032
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.6	4.6	4.6
Outdoor Unit	Total Current		A	5.4	8.5	9.7
	Volts		V	380	380	380
EXV Opening	Indoor Unit		STEP	180 | 250	250 | 300	350 | 350
	S.C(EXV4)			0	0	0
Pressure	High Pressure		bar	18.9	28.9	36.5
	Low Pressure			7.5	8.5	10.0
Temp.	Outdoor Unit	Discharge(TH1)	°C	69.4	88.8	102.9
		Suction(TH12)		12.3	15.9	21.3
		Compressor Bottom		35.9	42.4	53.0
	Indoor Unit	Coil In(Ti)		3.9	9.6	16.0
		Coil Mid™		5.8	9.5	16.5
		Coil Out(To)		9.0	10.7	17.5

Item \ Model(MDS B/BR)				060		
Condition	Ambient Temp.	Indoor	DB/WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity In Operation		2	2	2
		Model	-	032 | 028	032 | 028	032 | 028
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	5.5	5.5	5.5
Outdoor Unit	Total Current		A	13.6	25.3	27.8
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	292 | 203	355 | 327	412 | 400
	S.C(EXV4)			0	0	0
Pressure	High Pressure		bar	17.3	28.1	33.5
	Low Pressure			8.0	8.6	10.1
Temp.	Outdoor Unit	Discharge(TH1)	°C	68.9	86.7	89.1
		Suction(TH12)		12.2	14.8	14.2
		Compressor Bottom		47.1	47.6	49.8
	Indoor Unit	Coil In(Ti)		6.2	10.1	15.6
		Coil Mid™		6.5	10.1	17.2
		Coil Out(To)		9.0	10.3	17.2

Item \ Model(MDS B/BR)				060											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				32/23			
		Outdoor		18				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	015	015	015	015	015	015	015	015	015	015	015	015
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	5.5				5.5				5.5			
Outdoor Unit	Total Current		A	6.1				9.5				13.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	180	180	180	180	350	350	350	350	400	400	400	400
	S.C(EXV4)			0				0				0			
Pressure	High Pressure		bar	17.7				28.4				35.9			
	Low Pressure			8.1				8.3				10.8			
Temp.	Outdoor Unit	Discharge(TH1)	°C	56.8				79.7				82.1			
		Suction(TH12)		9.4				10.6				13.3			
		Compressor Bottom		33.9				43.8				45.1			
	Indoor Unit	Coil In(Ti)		5.1				9.2				17.5			
		Coil Mid™		6.0				9.4				17.5			
		Coil Out(To)		8.1				9.5				18.0			

Item \ Model(MDS B/BR)				070											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				32/23			
		Outdoor		18				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	015	020	018	020	015	020	018	020	015	020	018	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	7.2				7.2				7.2			
Outdoor Unit	Total Current		A	8.4				12.1				15.3			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	150	100	180	100	250	130	250	130	150	130	250	130
	S.C(EXV4)			0				0				0			
Pressure	High Pressure		bar	18				29.3				39.1			
	Low Pressure			7.3				8				9.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	67.1				89.1				99.6			
		Suction(TH12)		9.9				13.3				11.9			
		Compressor Bottom		35.5				43.1				47.3			
	Indoor Unit	Coil In(Ti)		5.1				9.2				14.6			
		Coil Mid™		5.5				9.6				15.1			
		Coil Out(To)		8.9				9.8				15.0			

Item			Model(MDS B/BR)	080											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.8				10.8				10.8			
Outdoor Unit	Total Current		A	11.5				15.2				19.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	218	218	218	218	256	256	256	256	272	272	272	272
	S.C(EXV4)			99				107				112			
Pressure	High Pressure		bar	23.7				29.1				34.2			
	Low Pressure			7.2				8.7				9.3			
Temp.	Outdoor Unit	Discharge(TH1)	°C	74.7				88.7				96.7			
		S.C Inlet(TH9)		34.0				46.0				53.0			
		S.C Outlet(TH10)		19.8				33.8				42.8			
		S.C Bypass Outlet(TH11)		29.2				41.2				48.2			
		Suction(TH12)		9.0				14.3				16.3			
		Compressor Bottom		32.9				40.2				44.2			
	Indoor Unit	Coil In(Ti)		4.3				9.6				11.6			
		Coil Mid(Tm)		4.0				9.3				11.3			
		Coil Out(To)		4.8				10.1				12.1			

Item			Model(MDS B/BR)	100											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	020	028	028	028	020	028	028	028	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.1				12.1				12.1			
Outdoor Unit	Total Current		A	12.7				16.8				21.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	293	293	293	218	331	331	331	256	347	347	347	272
	S.C(EXV4)			118				126				131			
Pressure	High Pressure		bar	23.2				28.6				33.7			
	Low Pressure			7.1				8.6				9.2			
Temp.	Outdoor Unit	Discharge(TH1)	°C	72.5				86.5				94.5			
		S.C Inlet(TH9)		32.0				44.0				52.0			
		S.C Outlet(TH10)		18.4				32.4				41.4			
		S.C Bypass Outlet(TH11)		28.0				40.0				48.0			
		Suction(TH12)		9.0				14.3				16.3			
		Compressor Bottom		31.7				39.0				43.0			
	Indoor Unit	Coil In(Ti)		4.5				9.8				11.8			
		Coil Mid(Tm)		4.2				9.5				11.5			
		Coil Out(To)		5.0				10.3				12.3			

Item			Model(MDS B/BR)	120											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	035	028	028	028	035	028	028	028	035
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	13.5				13.5				13.5			
Outdoor Unit	Total Current		A	14.1				18.7				23.9			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	293	293	293	325	331	331	331	363	347	347	347	379
	S.C(EXV4)			134				142				147			
Pressure	High Pressure		bar	23.7				29.1				34.2			
	Low Pressure			7.1				8.6				9.2			
Temp.	Outdoor Unit	Discharge(TH1)	°C	74.7				88.7				96.7			
		S.C Inlet(TH9)		33.7				45.7				53.7			
		S.C Outlet(TH10)		19.6				33.6				42.6			
		S.C Bypass Outlet(TH11)		29.2				41.2				49.2			
		Suction(TH12)		9.0				14.3				16.3			
		Compressor Bottom		32.9				40.2				44.2			
	Indoor Unit	Coil In(Ti)		4.3				9.6				11.6			
		Coil Mid(Tm)		4.0				9.3				11.3			
		Coil Out(To)		4.8				10.1				12.1			

Item			Model(MDS B/BR)	140											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	035	035	035	035	035	035	035	035	035	035
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				F			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	14.8				14.8				14.8			
Outdoor Unit	Total Current		A	16.5				21.8				27.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	325	325	325	325	363	363	363	363	379	379	379	379
	S.C(EXV4)			148				156				161			
Pressure	High Pressure		bar	23.3				28.7				33.8			
	Low Pressure			6.8				8.3				8.9			
Temp.	Outdoor Unit	Discharge(TH1)	°C	74.0				88.0				96.0			
		S.C Inlet(TH9)		33.0				45.0				53.0			
		S.C Outlet(TH10)		22.1				36.1				45.1			
		S.C Bypass Outlet(TH11)		31.8				43.8				51.8			
		Suction(TH12)		2.1				7.4				9.4			
		Compressor Bottom		29.2				36.5				40.5			
	Indoor Unit	Coil In(Ti)		3.0				8.3				10.3			
		Coil Mid(Tm)		3.1				8.4				10.4			
		Coil Out(To)		3.4				8.7				10.7			

Item			Model(MDS B/BR)	160											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	045	045	035	035	045	045	035	035	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	15.5				15.5				15.5			
Outdoor Unit	Total Current		A	18.2				24.1				30.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	325	325	347	347	363	363	385	385	379	379	401	401
	S.C(EXV4)			161				169				174			
Pressure	High Pressure		bar	24.1				29.5				34.6			
	Low Pressure			6.7				8.2				8.8			
Temp.	Outdoor Unit	Discharge(TH1)	°C	78.0				92.0				100.0			
		S.C Inlet(TH9)		35.8				47.8				55.8			
		S.C Outlet(TH10)		18.4				32.4				41.4			
		S.C Bypass Outlet(TH11)		29.1				41.1				49.1			
		Suction(TH12)		2.0				7.3				9.3			
		Compressor Bottom		30.5				37.8				41.8			
	Indoor Unit	Coil In(Ti)		2.9				8.2				10.2			
		Coil Mid(Tm)		3.0				8.3				10.3			
		Coil Out(To)		3.3				8.6				10.6			

Item			Model(MDS B/BR)	180											
Condition	Ambient Temp.	Indoor	DB/ WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	045	045	045	045	045	045	045	045	045	045	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	16.2				16.2				16.2			
Outdoor Unit	Total Current		A	21.5				28.5				36.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	347	347	347	347	385	385	385	385	401	401	401	401
	S.C(EXV4)			172				180				185			
Pressure	High Pressure		bar	24.3				29.7				34.8			
	Low Pressure			6.7				8.2				8.8			
Temp.	Outdoor Unit	Discharge(TH1)	°C	79.0				93.0				101.0			
		S.C Inlet(TH9)		36.0				48.0				56.0			
		S.C Outlet(TH10)		18.6				32.6				41.6			
		S.C Bypass Outlet(TH11)		29.3				41.3				49.3			
		Suction(TH12)		1.9				7.2				9.2			
		Compressor Bottom		30.7				38.0				42.0			
	Indoor Unit	Coil In(Ti)		3.1				8.4				10.4			
		Coil Mid(Tm)		3.2				8.5				10.5			
		Coil Out(To)		3.5				8.8				10.8			

Item			Model(MDS B/BR)	200											
Condition	Ambient Temp.	Indoor	DB/ WB	21/19				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	24.7				32.7				41.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	359	359	359	359	397	397	397	397	413	413	413	413
	S.C(EXV4)			219				227				232			
Pressure	High Pressure		bar	22.2				27.6				32.7			
	Low Pressure			6.4				7.9				8.5			
Temp.	Outdoor Unit	Discharge(TH1)	°C	70.1				84.1				92.1			
		S.C Inlet(TH9)		31.7				43.7				51.7			
		S.C Outlet(TH10)		17.7				31.7				40.7			
		S.C Bypass Outlet(TH11)		20.6				32.6				40.6			
		Suction(TH12)		3.1				8.4				10.4			
		Compressor Bottom		23.1				30.4				34.4			
	Indoor Unit	Coil In(Ti)		4.2				9.5				11.5			
		Coil Mid(Tm)		4.3				9.6				11.6			
		Coil Out(To)		4.5				9.8				11.8			

Item			Model(MDS B/BR)	220											
Condition	Ambient Temp.	Indoor	DB/ WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	19.6				19.6				19.6			
Outdoor Unit	Total Current		A	27.0				35.7				45.6			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	359	359	218	218	397	397	256	256	413	413	272	272
	S.C(EXV4)			235				243				248			
Pressure	High Pressure		bar	22.5				27.9				33.0			
	Low Pressure			6.3				7.8				8.4			
Temp.	Outdoor Unit	Discharge(TH1)	°C	72.3				86.3				94.3			
		S.C Inlet(TH9)		32.1				44.1				52.1			
		S.C Outlet(TH10)		18.1				32.1				41.1			
		S.C Bypass Outlet(TH11)		21.7				33.7				41.7			
		Suction(TH12)		3.0				8.3				10.3			
		Compressor Bottom		24.4				31.7				35.7			
	Indoor Unit	Coil In(Ti)		4.1				9.4				11.4			
		Coil Mid(Tm)		4.3				9.6				11.6			
		Coil Out(To)		4.4				9.7				11.7			

Item \ Model(MDS B/BR)				240											
Condition	Ambient Temp.	Indoor	DB/WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	21.5				21.5				21.5			
Outdoor Unit	Total Current		A	29.1				38.5				49.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	218	218	218	218	256	256	256	256	272	272	272	272
	S.C(EXV4)			251				259				264			
Pressure	High Pressure		bar	22.7				28.1				33.2			
	Low Pressure			6.2				7.7				8.3			
Temp.	Outdoor Unit	Discharge(TH1)	°C	73.3				87.3				95.3			
		S.C Inlet(TH9)		33.2				45.2				53.2			
		S.C Outlet(TH10)		19.2				33.2				42.2			
		S.C Bypass Outlet(TH11)		23.5				35.5				43.5			
		Suction(TH12)		2.9				8.2				10.2			
		Compressor Bottom		25.2				32.5				36.5			
	Indoor Unit	Coil In(Ti)		4.1				9.4				11.4			
		Coil Mid(Tm)		4.2				9.5				11.5			
		Coil Out(To)		4.4				9.7				11.7			

For Master & Slave Combination (5MDS260-500B/BR), please refer to the base model for reference.
Example: 5MDS260B/BR, please refer to 5MDS120B/BR (Master) and 5MDS140B/BR (Slave) as reference.
For 5MDS500B/BR, please refer to 5MDS240B/BR for both master and salve.

7.12 R410A MDS B Series Heating Cycle Reference

Item			Model(MDS B/BR)	050		
Condition	Ambient Temp.	Indoor	DB/WB	20	20/19	27/19
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	2	2	2
		Quantity In Operation		2	2	2
		Model	-	020 | 032	020 | 032	020 | 032
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.6	4.6	4.6
Outdoor Unit	Total Current		A	6.5	8.4	6.9
	Volts		V	380	380	380
EXV Opening	Indoor Unit		STEP	400 | 360	400 | 400	400 | 400
	EXV1			158	248	250
Pressure	High Pressure		bar	18.2	28.2	28.4
	Low Pressure			3.7	6.6	8.9
Temp.	Outdoor Unit	Discharge(TH1)	°C	73.0	92.2	89.7
		Suction(TH12)		-10.6	7.0	15.6
		Compressor Bottom		17.7	36.8	43.4
	Indoor Unit	Coil In(Ti)		26.2	37.5	40.0
		Coil Mid™		30.5	47.0	49.0
		Coil Out(To)		63.1	80.7	81.0

Item			Model(MDS B/BR)	060		
Condition	Ambient Temp.	Indoor	DB/WB	20/15	20/15	27/19
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	2	2	2
		Quantity In Operation		2	2	2
		Model	-	032 | 028	032 | 028	032 | 028
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	5.5	5.5	5.5
Outdoor Unit	Total Current		A	18.6	25.7	17.7
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	390 | 400	400 | 400	400 | 400
	EXV1			180	230	190
Pressure	High Pressure		bar	17.4	28.7	27.5
	Low Pressure			3.6	6.7	9.8
Temp.	Outdoor Unit	Discharge(TH1)	°C	76.8	93.7	90.3
		Suction(TH12)		-6.4	7.0	20.2
		Compressor Bottom		31.3	43.5	56.5
	Indoor Unit	Coil In(Ti)		18.4	34.5	36.5
		Coil Mid™		27.8	45.2	44.3
		Coil Out(To)		58.5	80.7	76.2

Item \ Model(MDS B/BR)				060											
Condition	Ambient Temp.	Indoor	DB/WB	20/15				20/16				27/19			
		Outdoor		-9				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	015	015	015	015	015	015	015	015	015	015	015	015
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	5.5				5.5				5.5			
Outdoor Unit	Total Current		A	8.1				9.7				8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	450	450	450	450	450	450	450	450	450	450	450	450
	EXV1			180				310				230			
Pressure	High Pressure		bar	19.9				27.5				26.4			
	Low Pressure			4				6.7				9.4			
Temp.	Outdoor Unit	Discharge(TH1)	°C	52.4				83.4				77.9			
		Suction(TH12)		-15.3				6.1				17.0			
		Compressor Bottom		13.9				44.9				47.4			
	Indoor Unit	Coil In(Ti)		28.4				32.3				34.2			
		Coil Mid™		33.6				45.5				45.0			
		Coil Out(To)		48.9				78.1				71.2			

Item \ Model(MDS B/BR)				070											
Condition	Ambient Temp.	Indoor	DB/WB	20/15				20/15				27			
		Outdoor		-9				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	015	020	018	020	015	020	018	020	015	020	018	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	7.2				7.2				7.2			
Outdoor Unit	Total Current		A	10.2				11.9				9.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	450	400	450	400	450	400	450	400	450	400	450	400
	EXV1			100				130				130			
Pressure	High Pressure		bar	22.3				29.0				30.7			
	Low Pressure			3.5				6.5				9.5			
Temp.	Outdoor Unit	Discharge(TH1)	°C	85.0				89.4				88.5			
		Suction(TH12)		-8.2				4.9				13.7			
		Compressor Bottom		13.5				36.1				41.9			
	Indoor Unit	Coil In(Ti)		29.9				32.1				40.3			
		Coil Mid™		36.1				45.7				49.2			
		Coil Out(To)		68.7				78.5				79.0			

Item			Model(MDS B/BR)	080											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.8				10.8				10.8			
Outdoor Unit	Total Current		A	12.2				14.2				9.7			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			145				129				96			
Pressure	High Pressure		bar	22.3				28.0				28.7			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	77.6				89.1				64.6			
		S.C Inlet(TH9)		23.4				24.1				30.9			
		S.C Outlet(TH10)		25.9				28.8				35.6			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.9				31.2				42.8			
	Indoor Unit	Coil In(Ti)		31.9				32.7				39.1			
		Coil Mid(Tm)		34.5				47.0				47.9			
		Coil Out(To)		62.0				78.9				73.1			

Item			Model(MDS B/BR)	100											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	020	028	028	028	020	028	028	028	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.1				12.1				12.1			
Outdoor Unit	Total Current		A	14.4				16.8				11.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			178				159				118			
Pressure	High Pressure		bar	22.6				28.3				29.0			
	Low Pressure			4.2				6.4				8.7			
Temp.	Outdoor Unit	Discharge(TH1)	°C	78.5				90.0				65.5			
		S.C Inlet(TH9)		23.7				24.4				31.2			
		S.C Outlet(TH10)		26.2				29.1				35.9			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		32.2				33.0				39.4			
		Coil Mid(Tm)		35.0				47.5				48.4			
		Coil Out(To)		62.8				79.7				73.9			

Item \ Model(MDS B/BR)				120											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	035	028	028	028	035	028	028	028	035
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	13.5				13.5				13.5			
Outdoor Unit	Total Current		A	16.1				18.7				12.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			215				192				142			
Pressure	High Pressure		bar	22.2				27.9				28.5			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	77.2				88.7				64.2			
		S.C Inlet(TH9)		23.3				24.0				30.8			
		S.C Outlet(TH10)		25.8				28.7				35.5			
		S.C Bypass Outlet(TH11)		18.4				22.0				30.1			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.8				31.0				42.6			
	Indoor Unit	Coil In(Ti)		31.7				32.5				38.9			
		Coil Mid(Tm)		34.3				46.8				47.7			
		Coil Out(To)		61.7				78.5				72.7			

Item \ Model(MDS B/BR)				140											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	035	035	035	035	035	035	035	035	035	035
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	14.8				14.8				14.8			
Outdoor Unit	Total Current		A	18.1				21.1				14.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			157				140				104			
Pressure	High Pressure		bar	22.4				28.2				28.8			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	78.1				89.6				65.1			
		S.C Inlet(TH9)		23.5				24.2				31.0			
		S.C Outlet(TH10)		26.1				29.0				35.8			
		S.C Bypass Outlet(TH11)		18.6				22.2				30.3			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.1				31.3				42.9			
	Indoor Unit	Coil In(Ti)		32.0				32.8				39.2			
		Coil Mid(Tm)		34.7				47.3				48.2			
		Coil Out(To)		62.4				79.3				73.5			

Item \ Model(MDS B/BR)				160											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	045	045	035	035	045	045	035	035	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	15.5				15.5				15.5			
Outdoor Unit	Total Current		A	20.3				23.6				16.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			178				159				118			
Pressure	High Pressure		bar	22.3				28.0				28.7			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	77.6				89.1				64.6			
		S.C Inlet(TH9)		23.4				24.1				30.9			
		S.C Outlet(TH10)		25.9				28.8				35.6			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.9				31.2				42.8			
	Indoor Unit	Coil In(Ti)		31.9				32.7				39.1			
		Coil Mid(Tm)		34.5				47.0				47.9			
		Coil Out(To)		62.0				78.9				73.1			

Item \ Model(MDS B/BR)				180											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	045	045	045	045	045	045	045	045	045	045	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	16.2				16.2				16.2			
Outdoor Unit	Total Current		A	24.5				28.5				19.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			200				179				132			
Pressure	High Pressure		bar	22.6				28.3				29.0			
	Low Pressure			4.2				6.4				8.7			
Temp.	Outdoor Unit	Discharge(TH1)	°C	78.5				90.0				65.5			
		S.C Inlet(TH9)		23.7				24.4				31.2			
		S.C Outlet(TH10)		26.2				29.1				35.9			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		32.2				33.0				39.4			
		Coil Mid(Tm)		35.0				47.5				48.4			
		Coil Out(To)		62.8				79.7				73.9			

Item \ Model(MDS B/BR)				200											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	26.7				31.0				21.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			178				159				118			
Pressure	High Pressure		bar	22.7				28.4				29.0			
	Low Pressure			4.3				6.4				8.7			
Temp.	Outdoor Unit	Discharge(TH1)	°C	78.8				90.3				65.8			
		S.C Inlet(TH9)		23.7				24.4				31.2			
		S.C Outlet(TH10)		26.3				29.2				36.0			
		S.C Bypass Outlet(TH11)		18.8				22.4				30.5			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.3				31.6				43.2			
	Indoor Unit	Coil In(Ti)		32.3				33.1				39.5			
		Coil Mid(Tm)		35.1				47.6				48.5			
		Coil Out(To)		63.1				79.9				74.2			

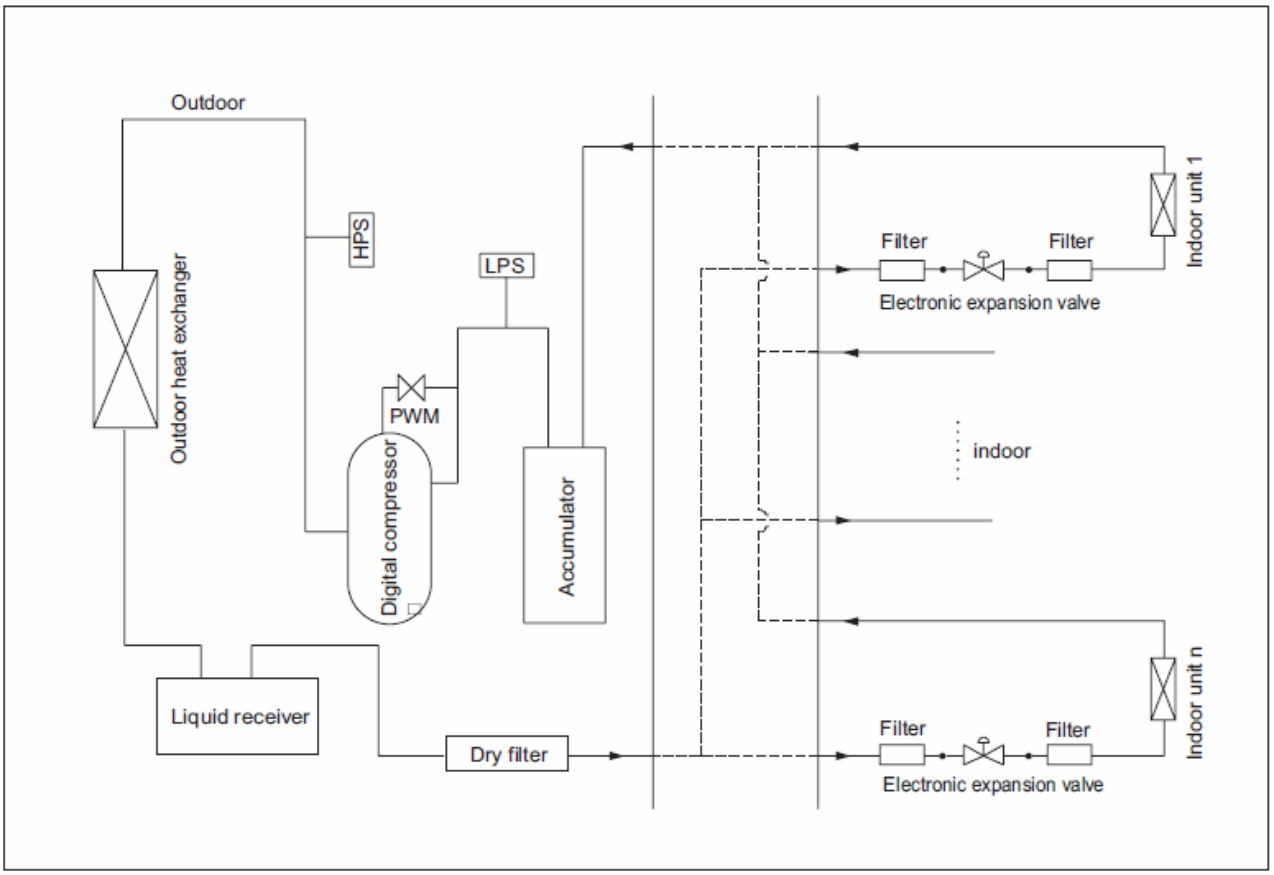
Item \ Model(MDS B/BR)				220											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	19.6				19.6				19.6			
Outdoor Unit	Total Current		A	29.1				33.8				23.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			196				175				129			
Pressure	High Pressure		bar	22.3				28.1				28.7			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	°C	77.7				89.2				64.7			
		S.C Inlet(TH9)		23.4				24.1				30.9			
		S.C Outlet(TH10)		25.9				28.9				35.7			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.0				31.2				42.8			
	Indoor Unit	Coil In(Ti)		31.9				32.7				39.1			
		Coil Mid(Tm)		34.5				47.1				48.0			
		Coil Out(To)		62.1				79.0				73.2			

Item			Model(MDS B/BR)	240											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	21.5				21.5				21.5			
Outdoor Unit	Total Current		A	30.9				35.9				24.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			215				192				142			
Pressure	High Pressure		bar	21.9				27.7				28.3			
	Low Pressure			4.1				6.2				8.5			
Temp.	Outdoor Unit	Discharge(TH1)	°C	76.5				88.0				63.5			
		S.C Inlet(TH9)		23.1				23.8				30.6			
		S.C Outlet(TH10)		25.5				28.5				35.3			
		S.C Bypass Outlet(TH11)		18.2				21.8				29.9			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.5				30.8				42.4			
	Indoor Unit	Coil In(Ti)		31.4				32.2				38.6			
		Coil Mid(Tm)		33.9				46.4				47.3			
		Coil Out(To)		61.0				77.9				72.1			

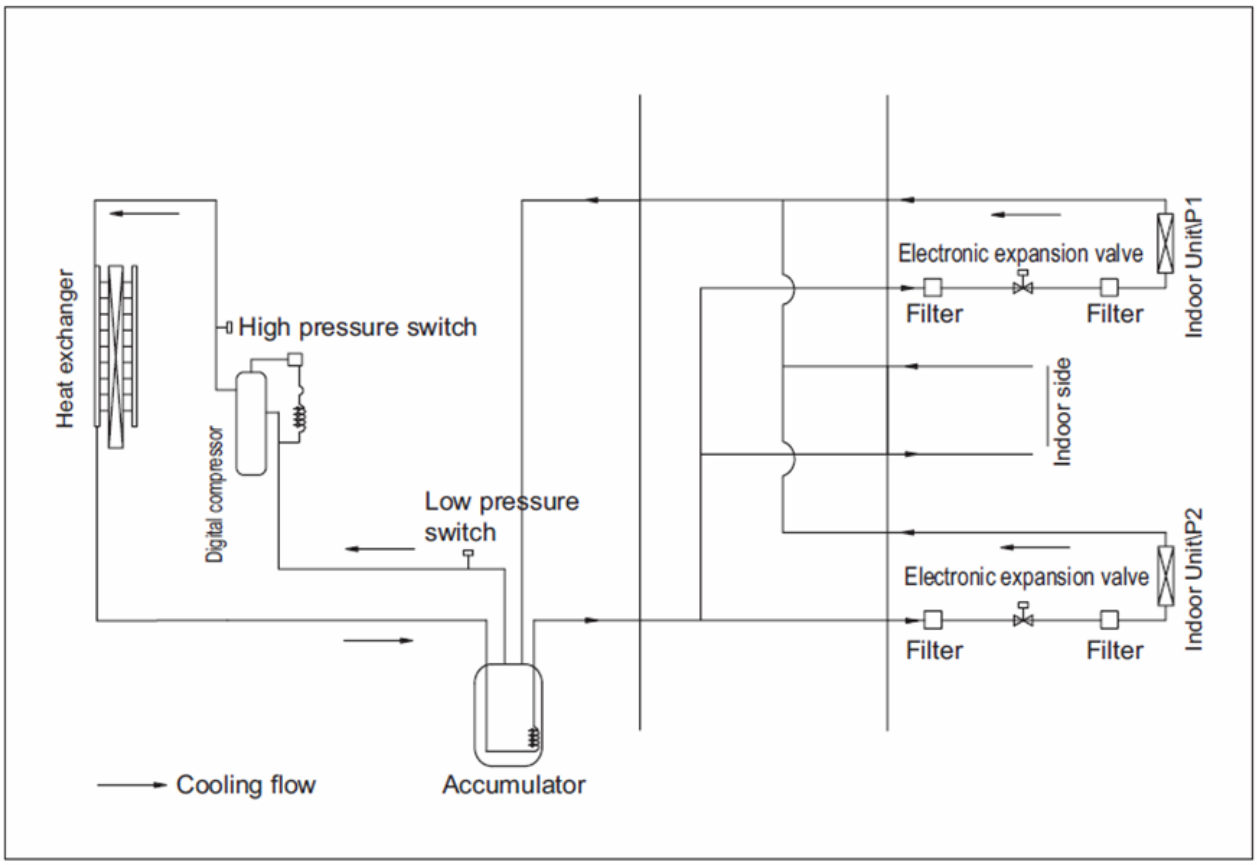
For Master & Slave Combination (5MDS260-500BR), please refer to the base model for reference.
Example: 5MDS260BR, please refer to 5MDS120BR (Master) and 5MDS140BR (Slave) as reference.
For 5MDS500BR, please refer to 5MDS240BR for both master and salve.

7.13 Refrigerant Circuit Diagram

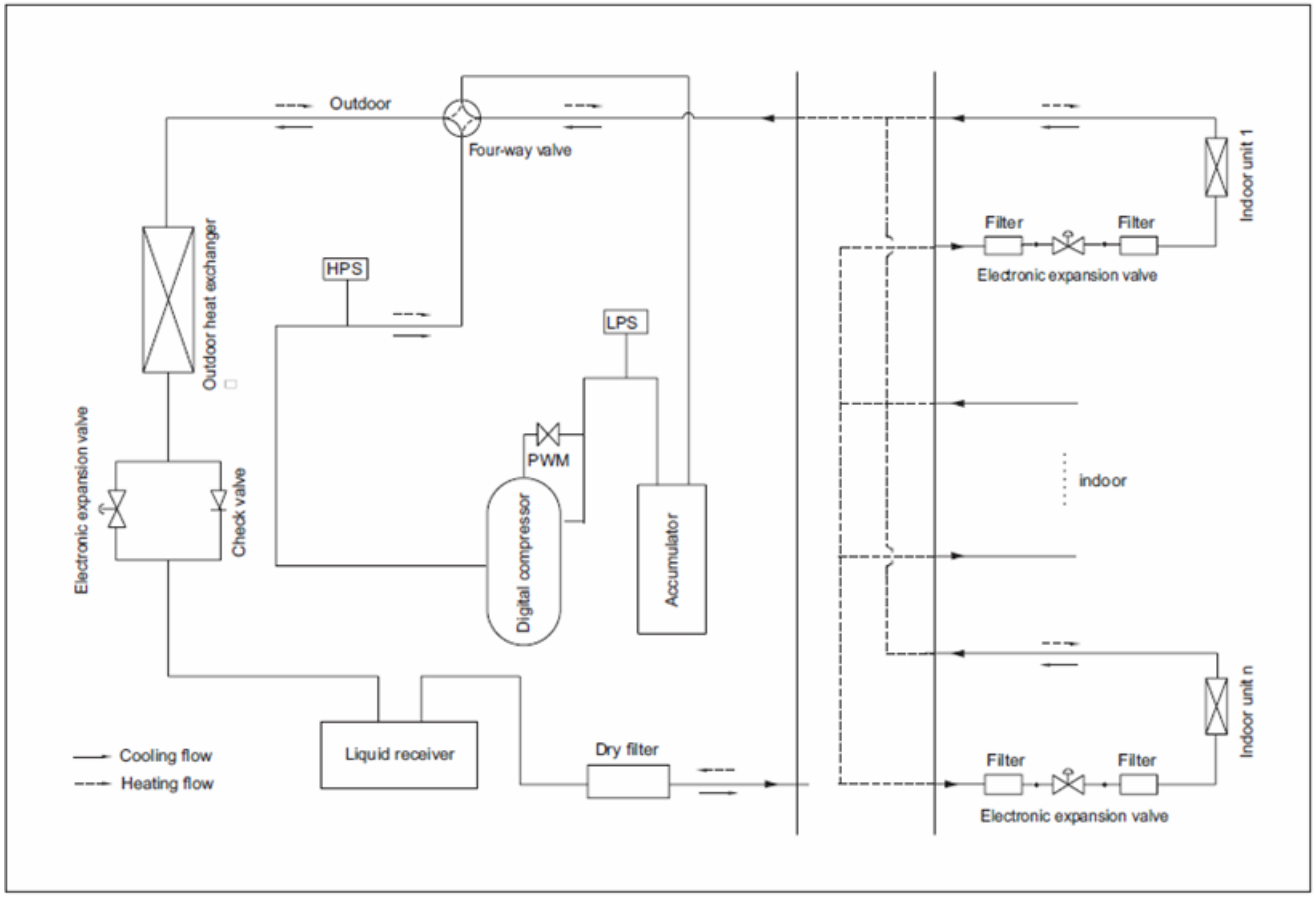
MDS 30/40/50/60A



MDS 70A



MDS 30/40/50/60AR



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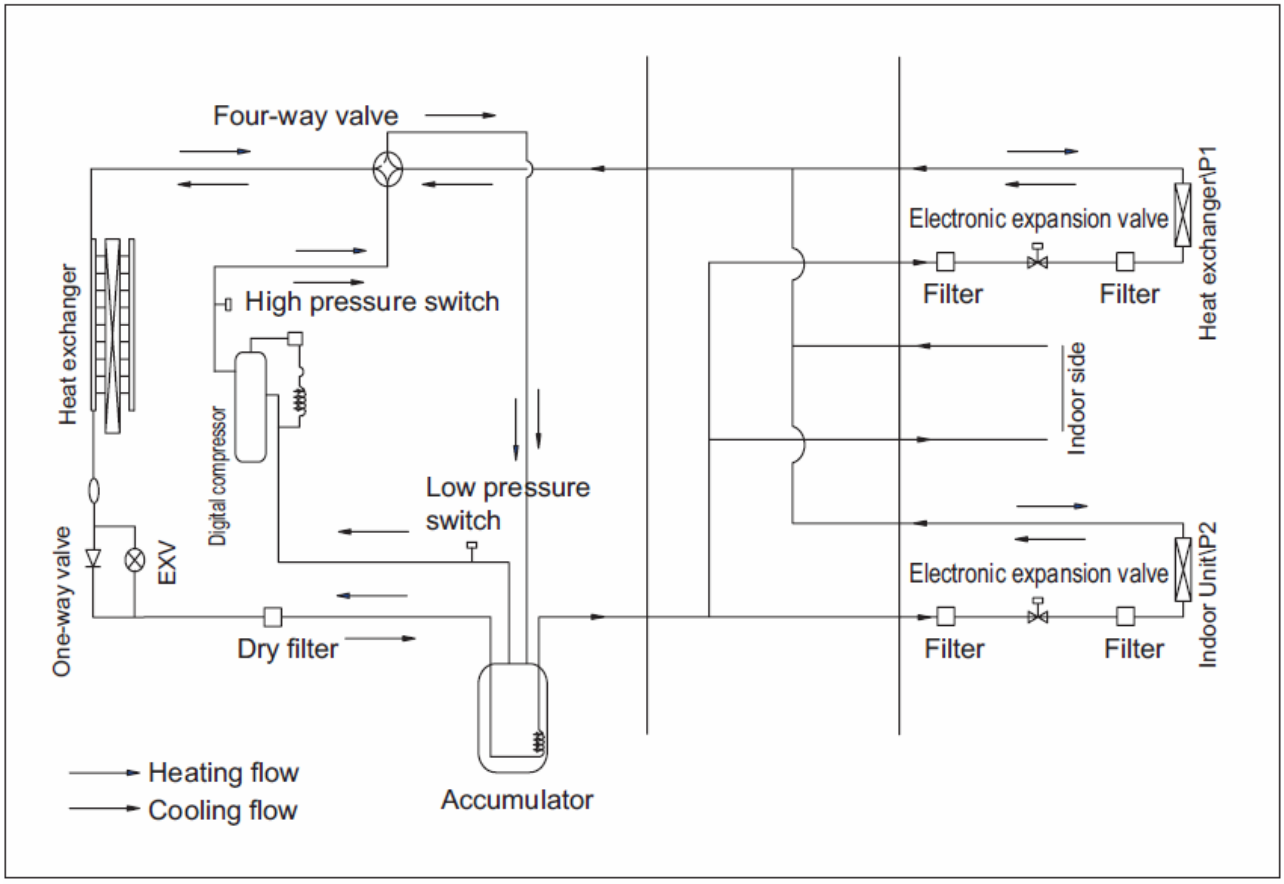
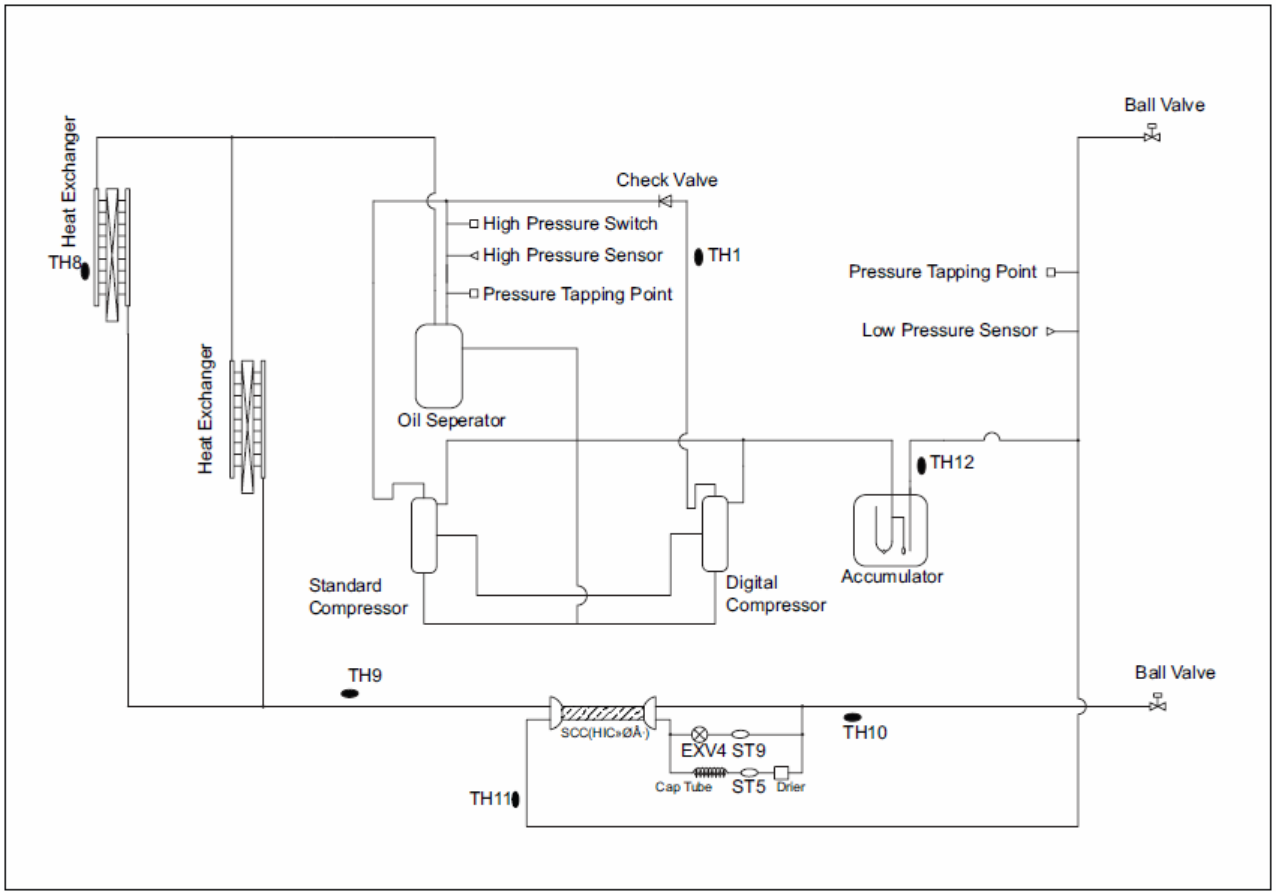


MDS 80/100/120B



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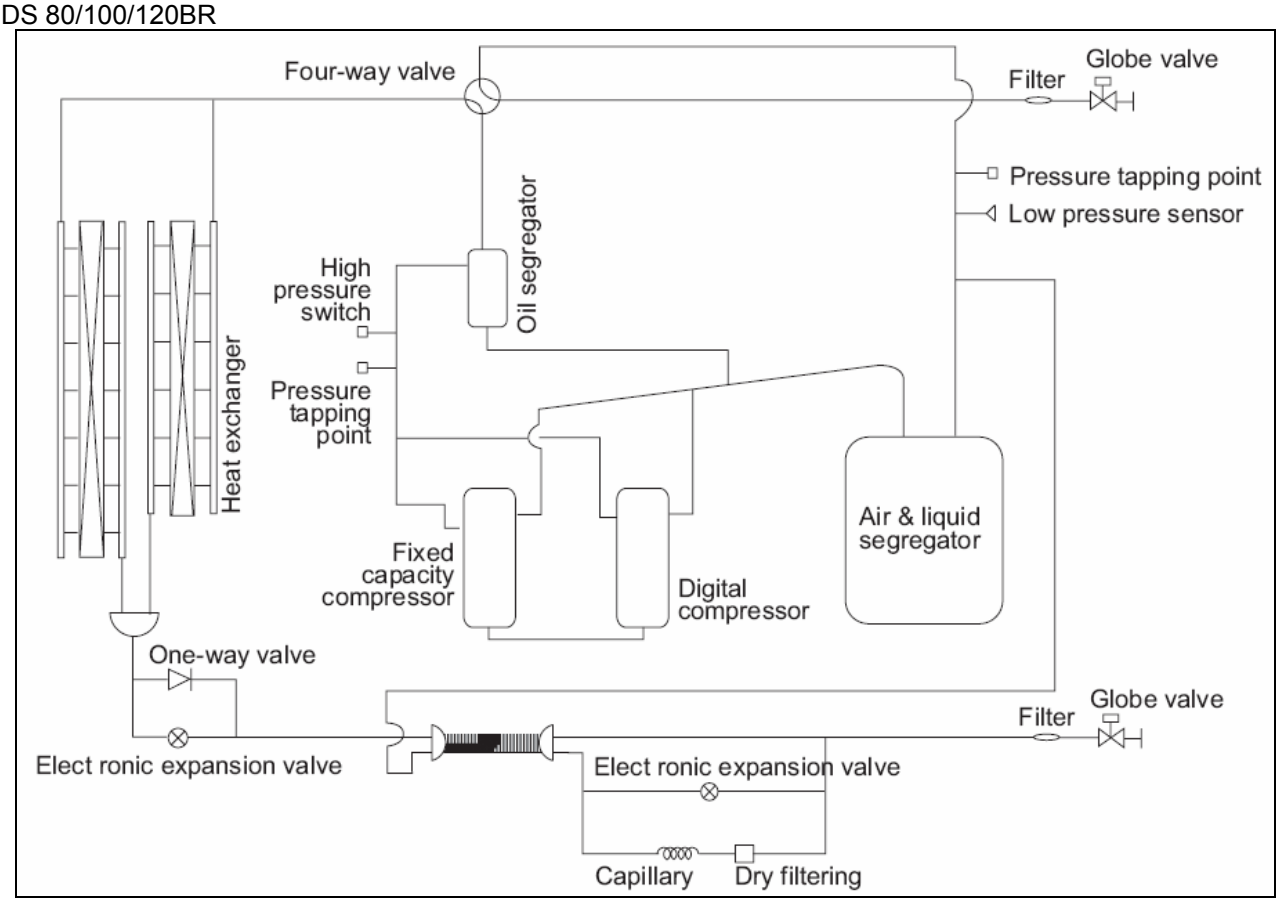

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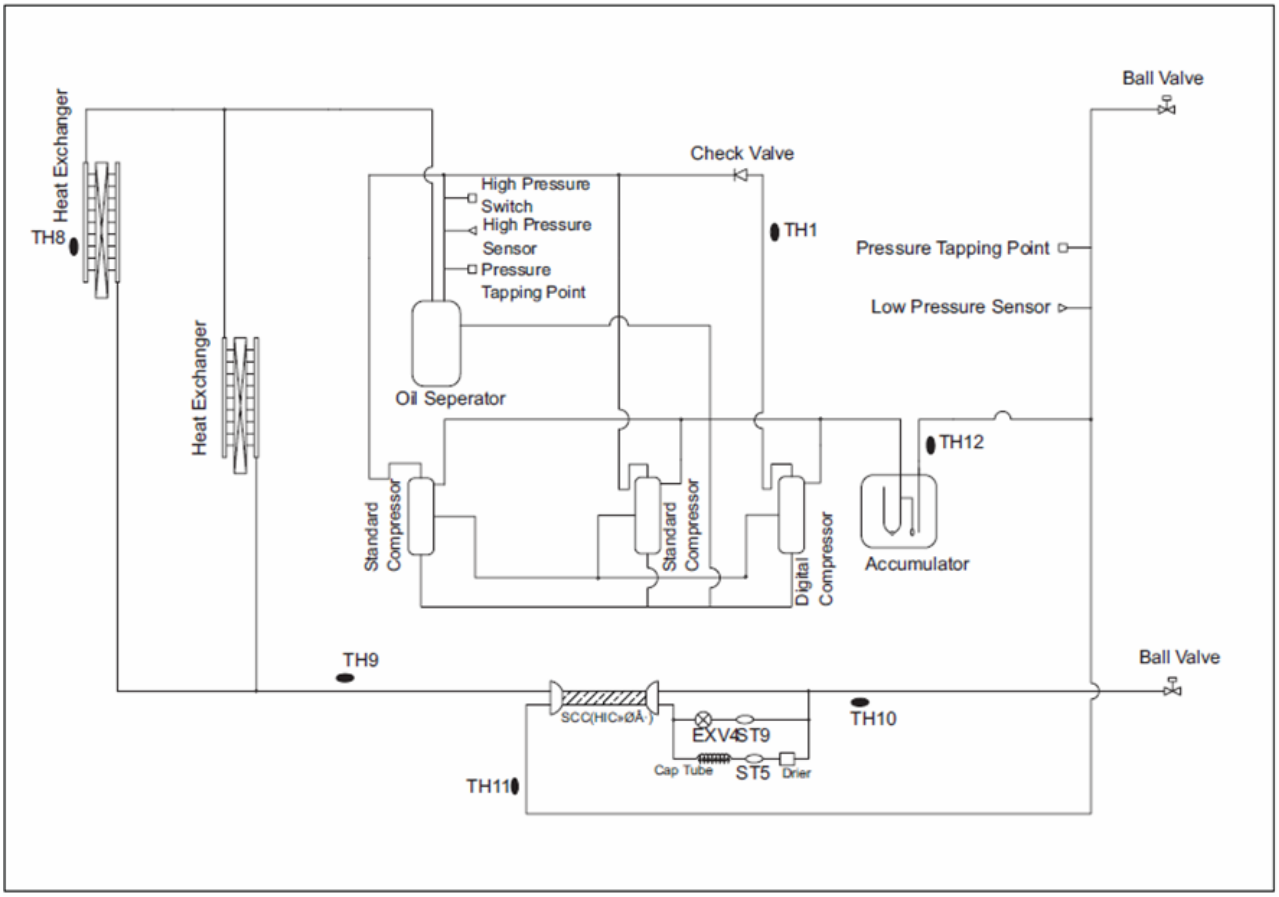
MDS 150B



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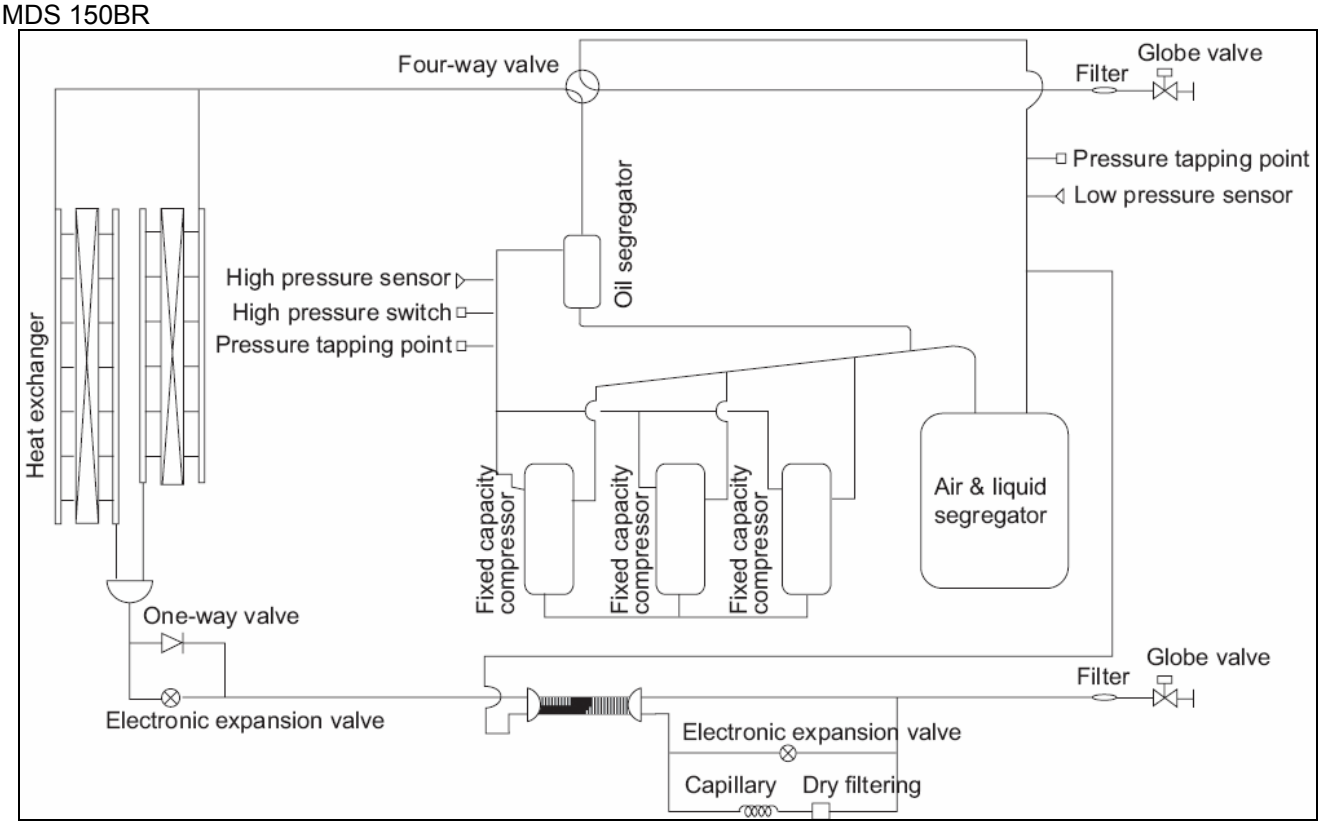
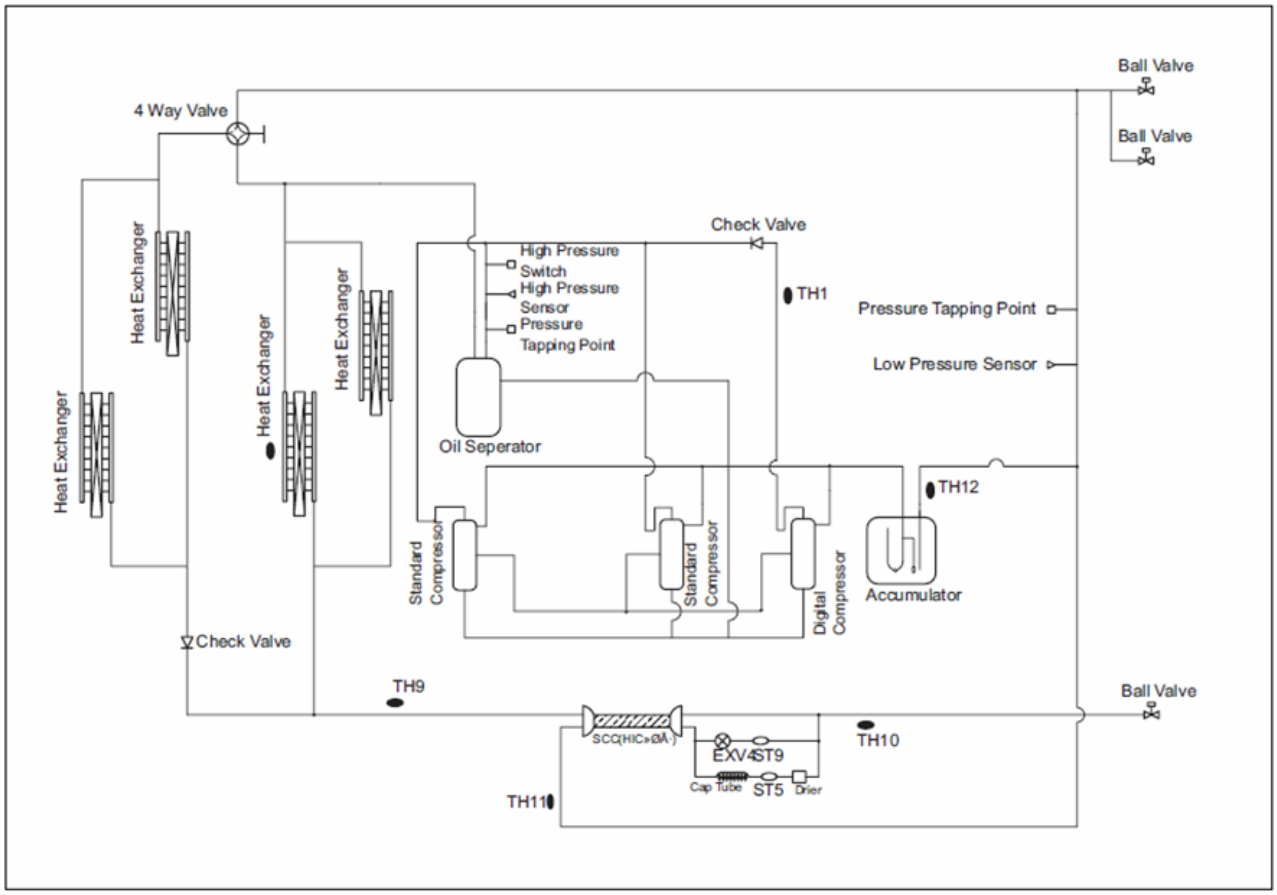
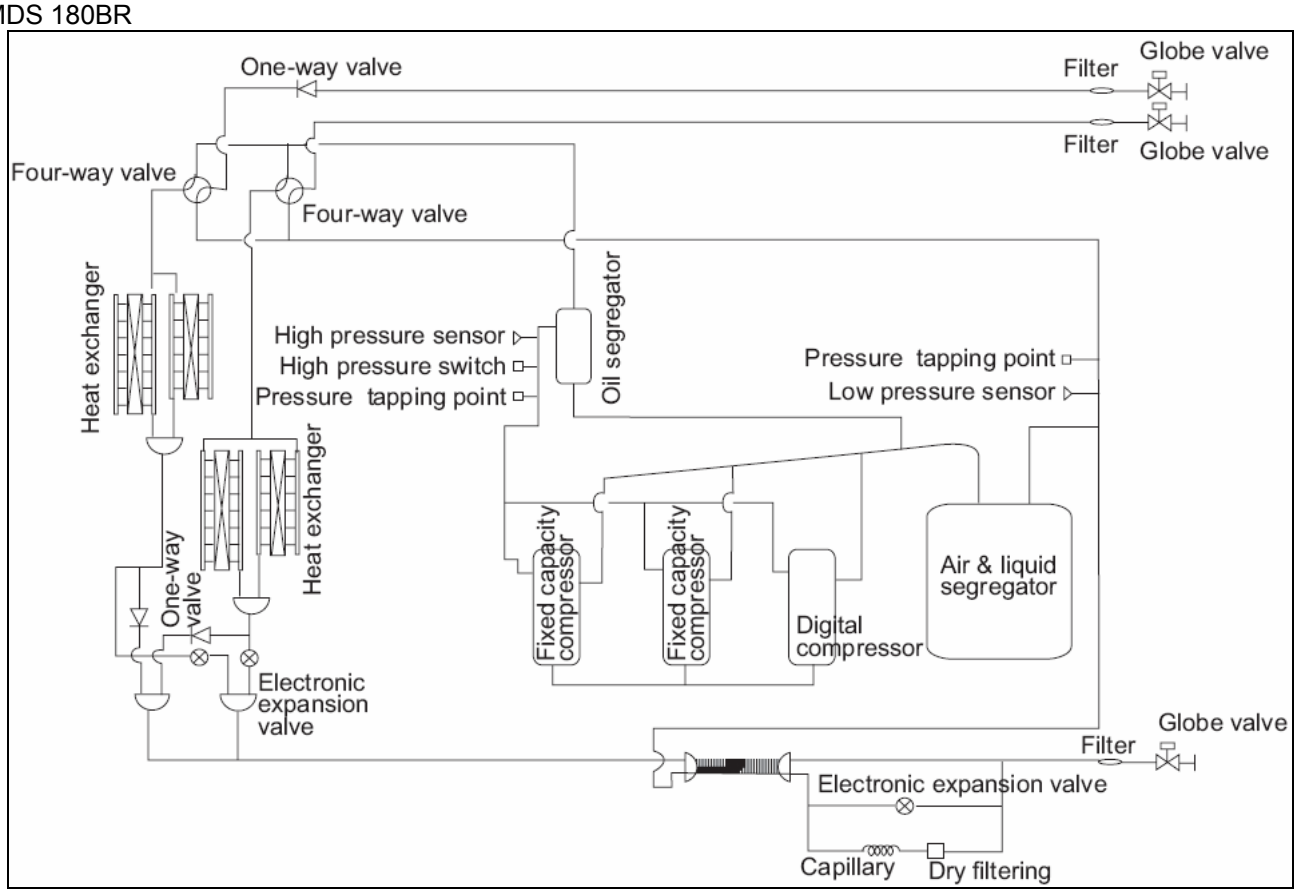


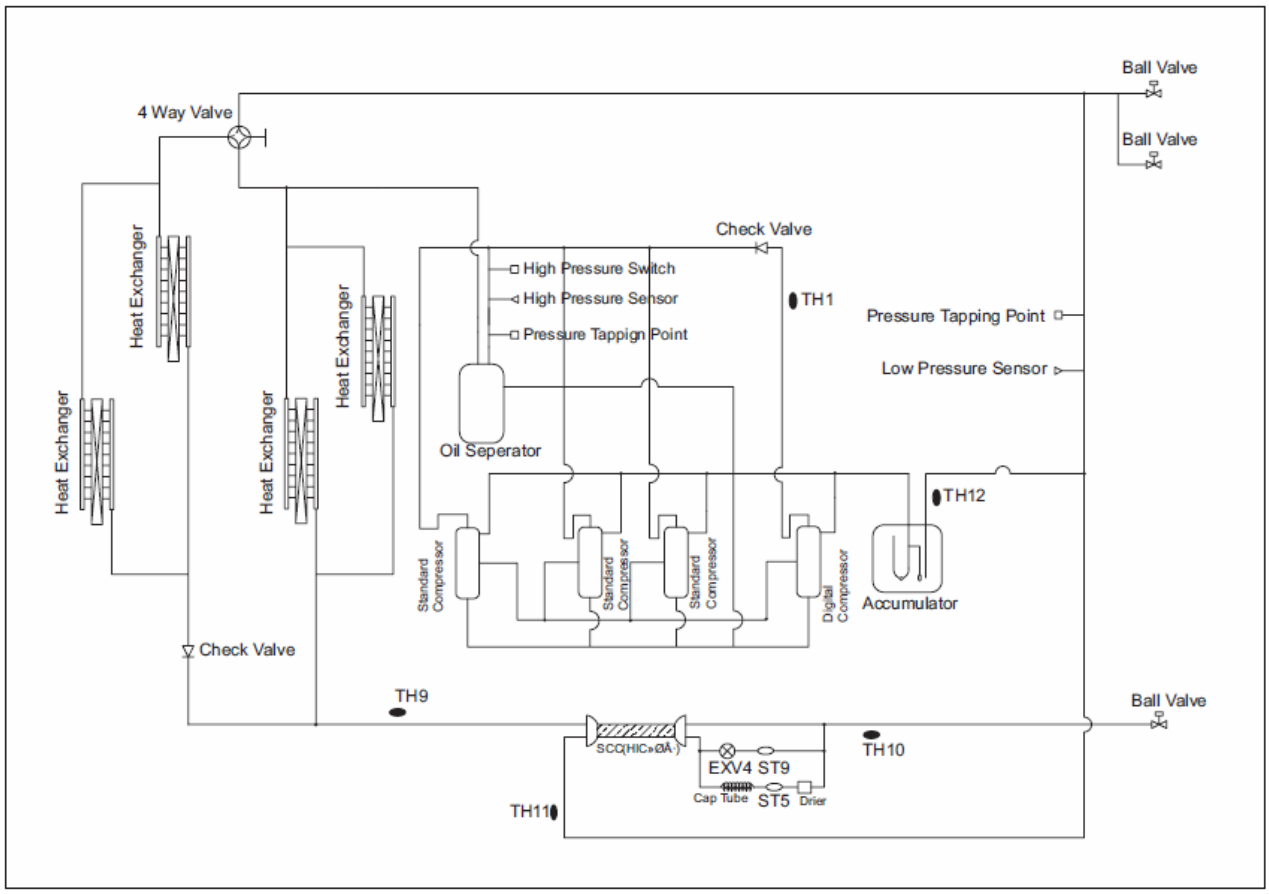
MDS 180B



MDS 180BR



MDS 200/220/240B



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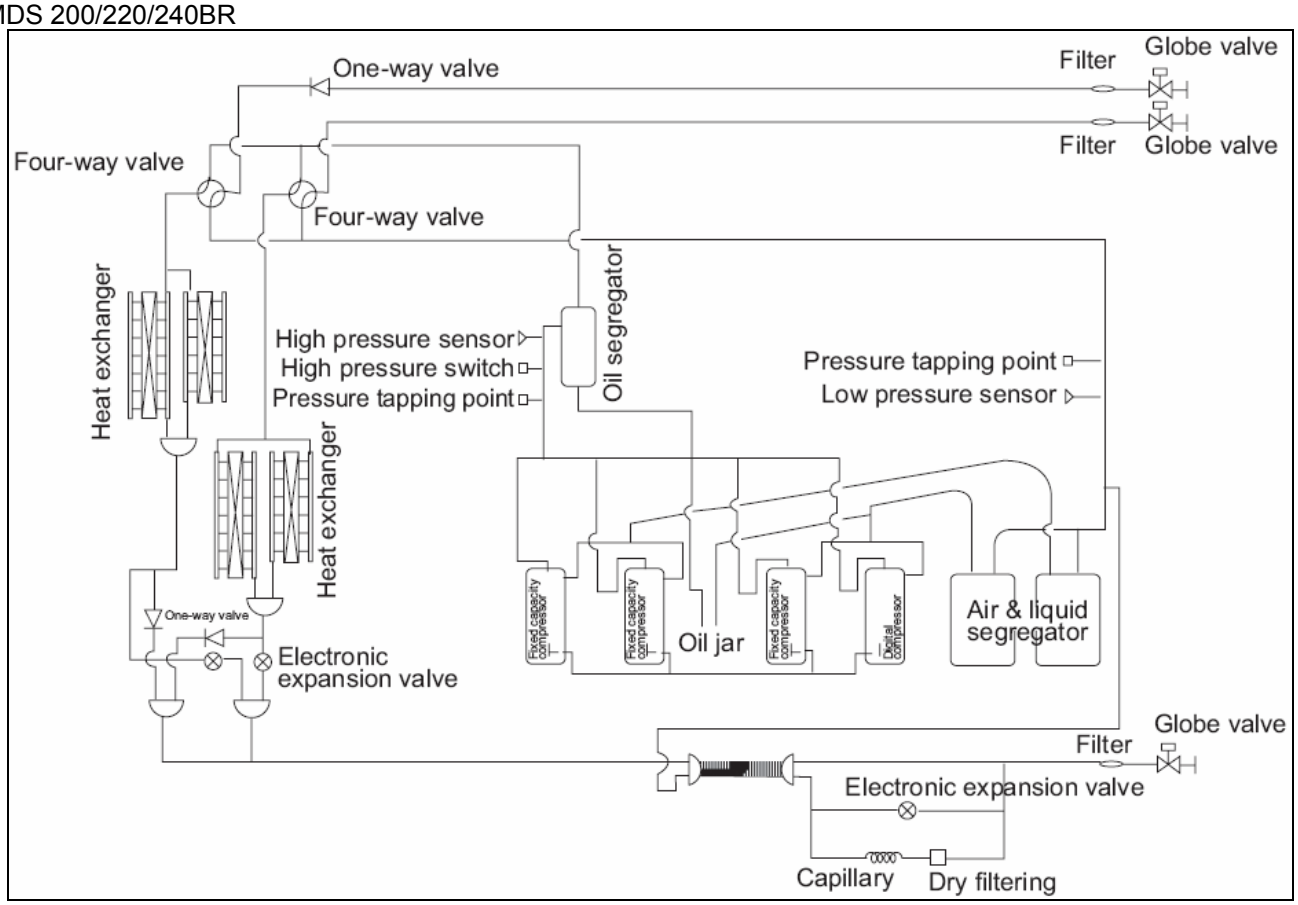

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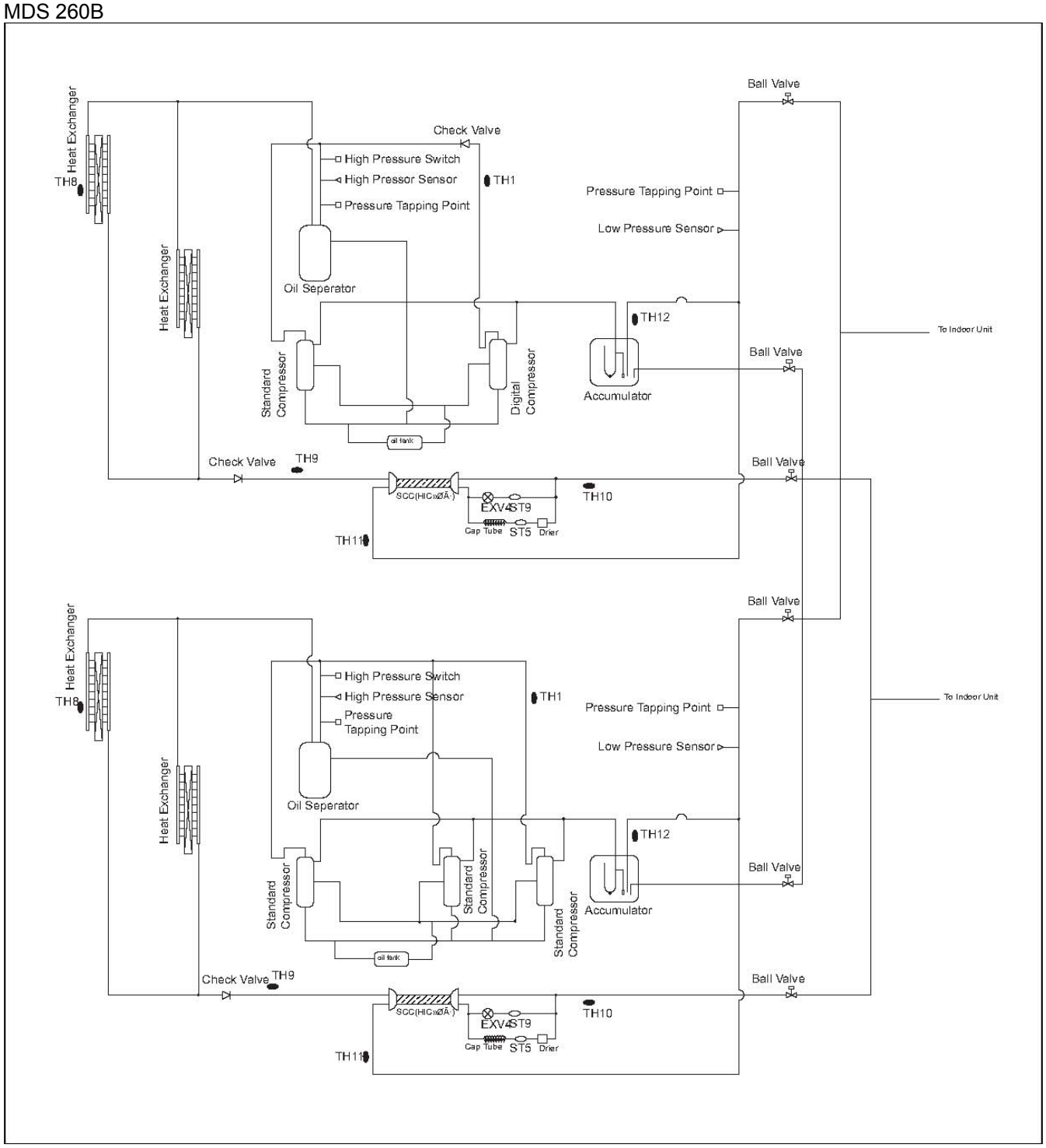
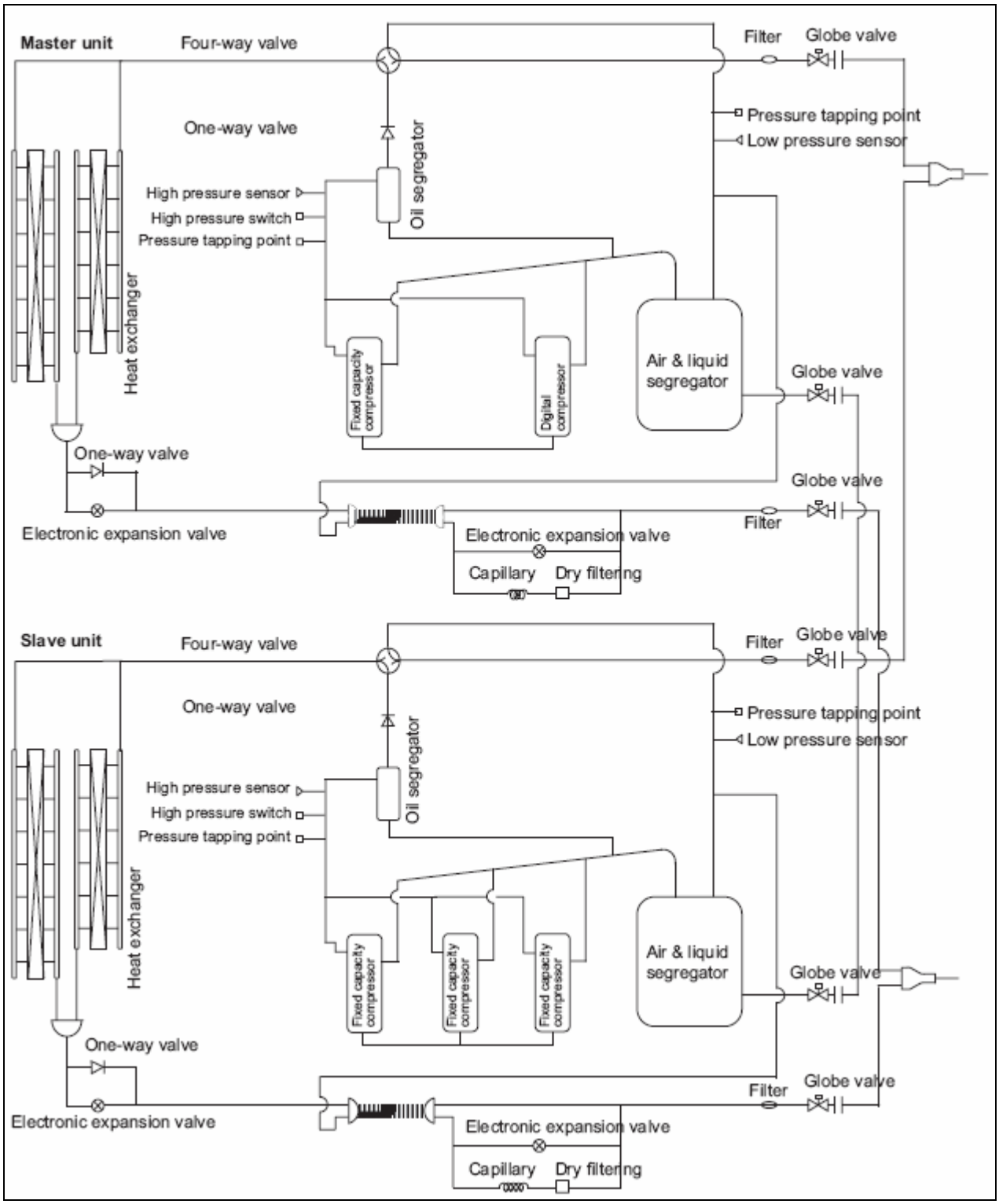
MDS 260B

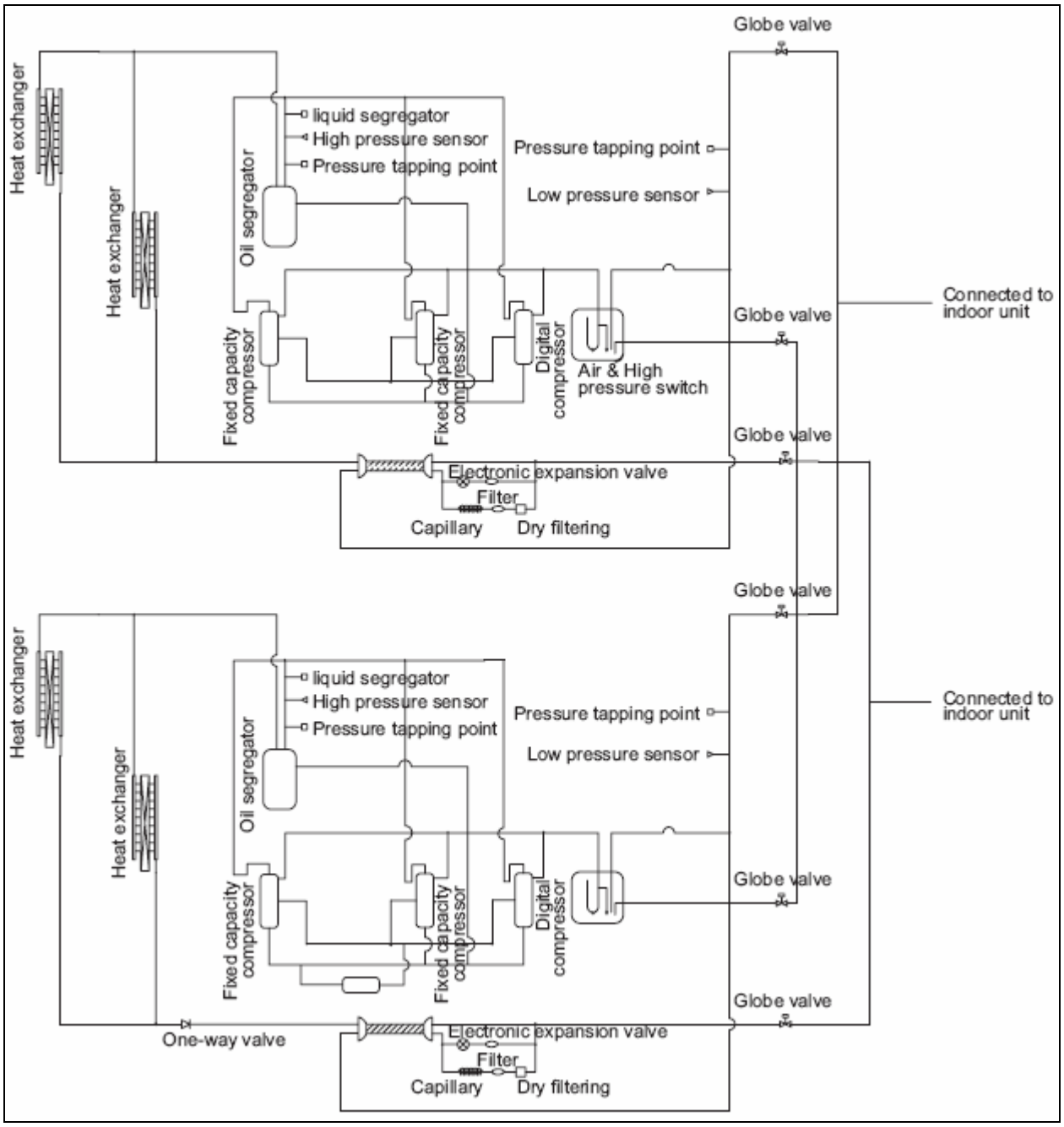

Heat Exchanger
TH8
Heat Exchanger
Check Valve
High Pressure Switch
High Pressor Sensor
Pressure Tapping Point
TH1
Oil Seperator
Standard Compressor
Digital Compressor
oil tank
Ball Valve
Pressure Tapping Point
Low Pressure Sensor
TH12
Accumulator
To Indoor Unit
Ball Valve
Check Valve
TH9
Ball Valve
SCC(HIC)
EXV
ST9
Cap Tube
ST5
Drier
TH10
TH11
Heat Exchanger
TH8
Heat Exchanger
High Pressure Switch
High Pressure Sensor
Pressure Tapping Point
TH1
Oil Seperator
Standard Compressor
Standard Compressor
Standard Compressor
oil tank
Ball Valve
Pressure Tapping Point
Low Pressure Sensor
TH12
Accumulator
To Indoor Unit
Ball Valve
Check Valve
TH9
Ball Valve
SCC(HIC)
EXV
ST9
Cap Tube
ST5
Drier
TH10
TH11

MDS 260BR


Master unit
Four-way valve
Filter
Globe valve
Pressure tapping point
Low pressure sensor
One-way valve
Oil segregator
High pressure sensor
High pressure switch
Pressure tapping point
Heat exchanger
Fixed capacity compressor
Digital compressor
Air & liquid segregator
Globe valve
One-way valve
Globe valve
Electronic expansion valve
Filter
Electronic expansion valve
Capillary
Dry filtering
Slave unit
Four-way valve
Filter
Globe valve
One-way valve
Pressure tapping point
Low pressure sensor
Oil segregator
High pressure sensor
High pressure switch
Pressure tapping point
Heat exchanger
Fixed capacity compressor
Fixed capacity compressor
Fixed capacity compressor
Air & liquid segregator
Globe valve
One-way valve
Filter
Globe valve
Electronic expansion valve
Electronic expansion valve
Capillary
Dry filtering

7

MDS 280/300/320B



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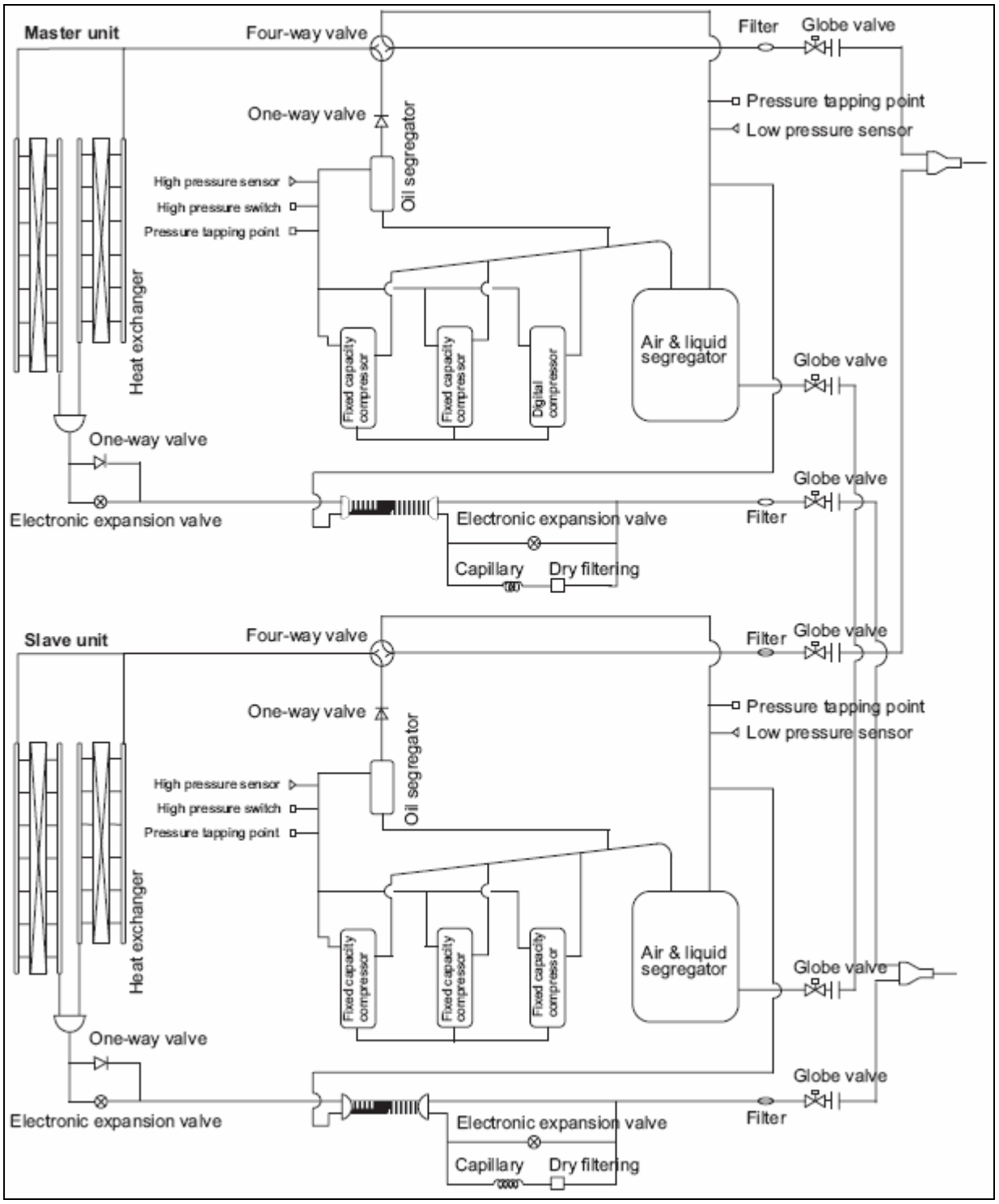
MDS 280/300/320BR



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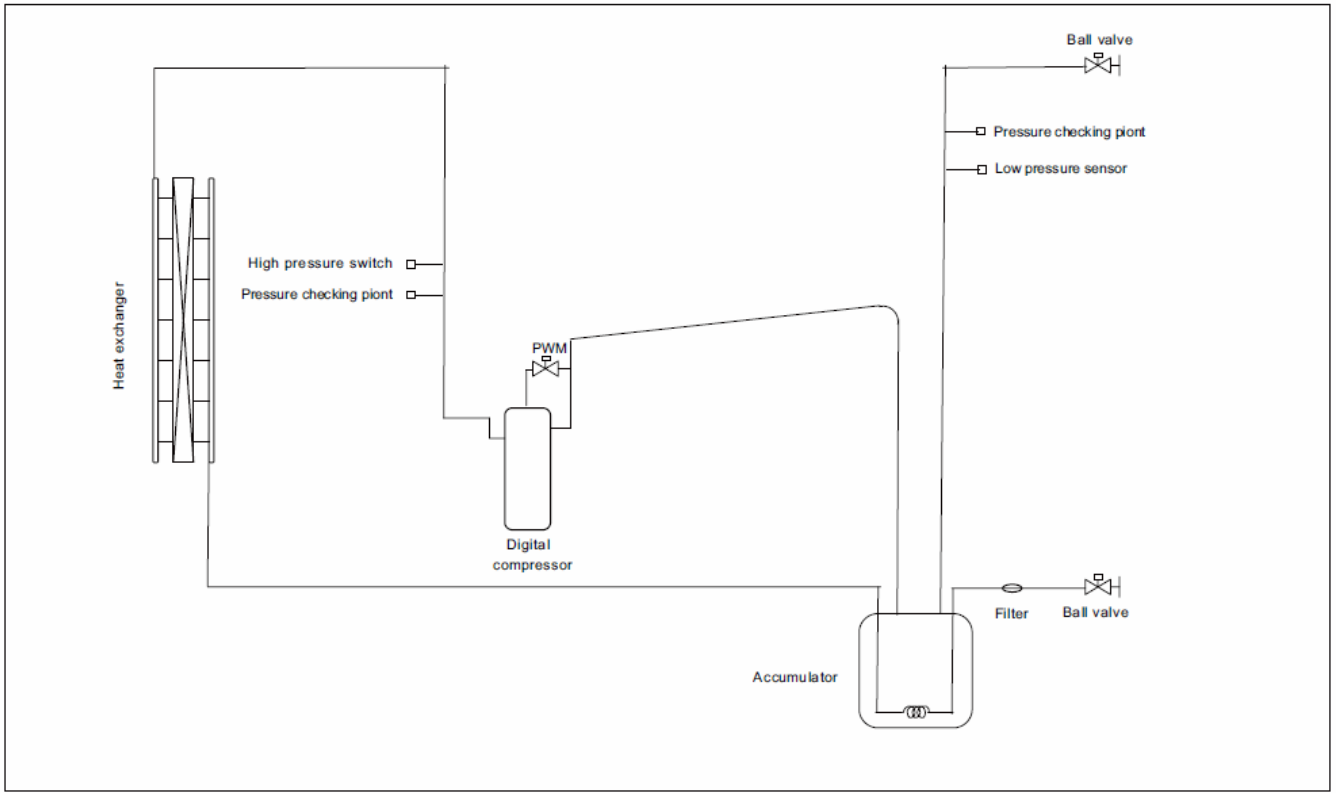
5MDS 50/60/70B



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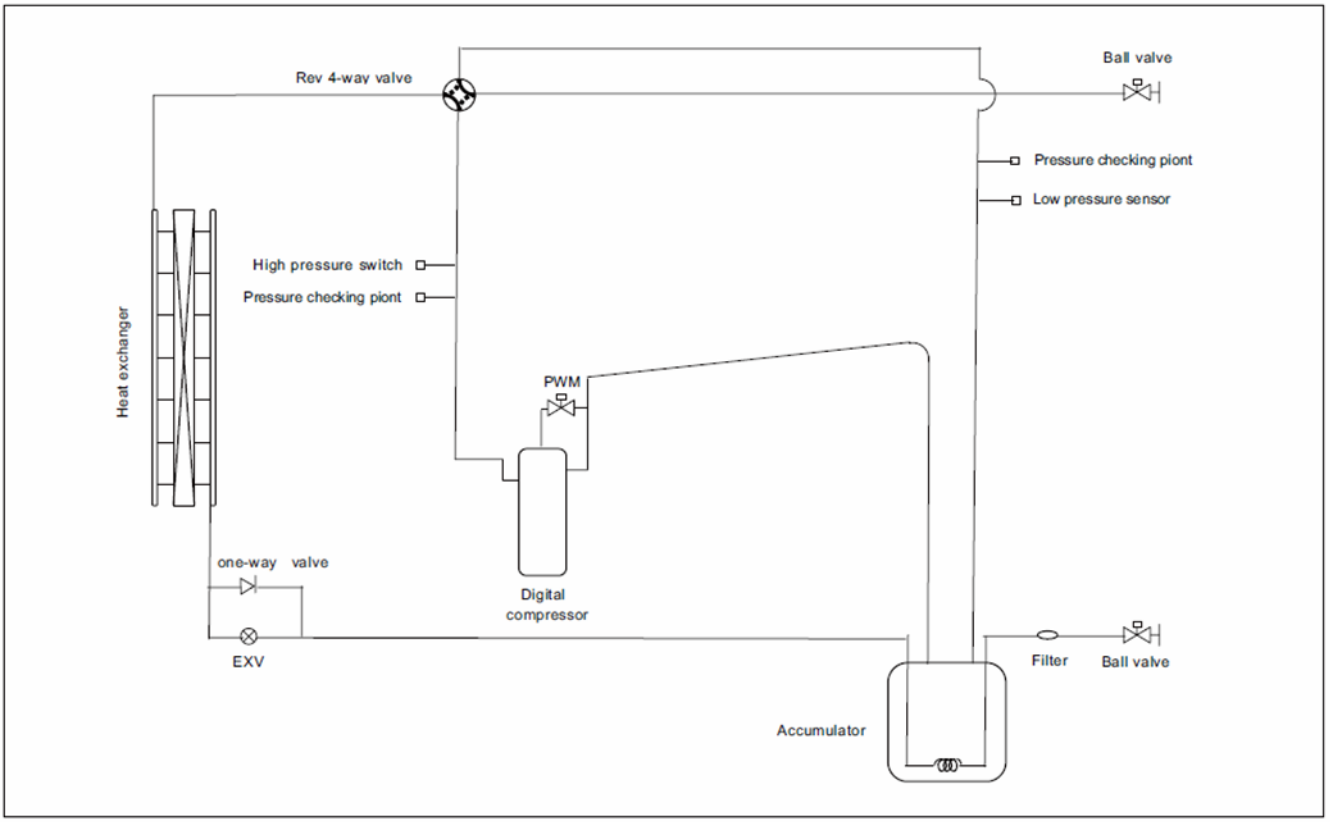
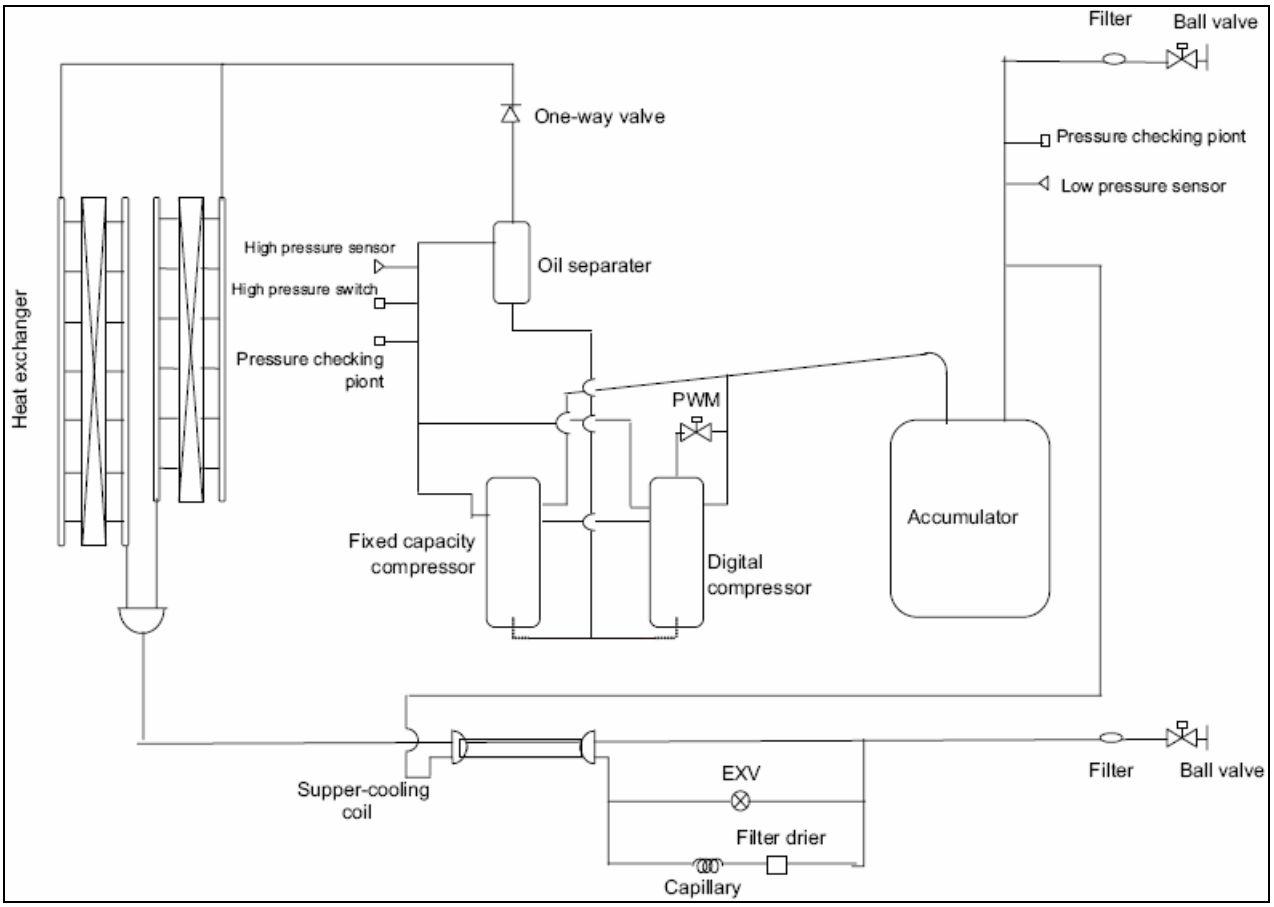
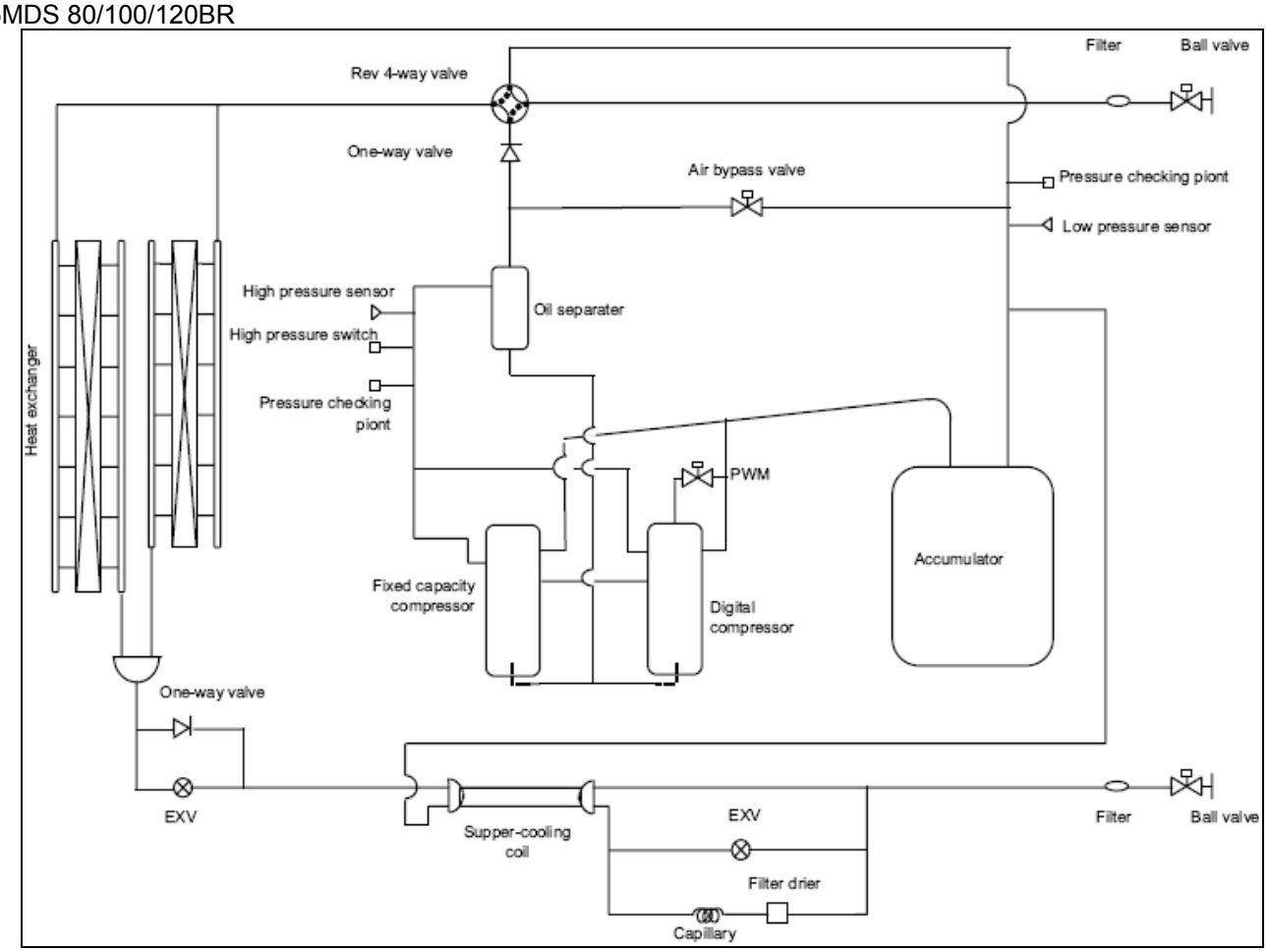


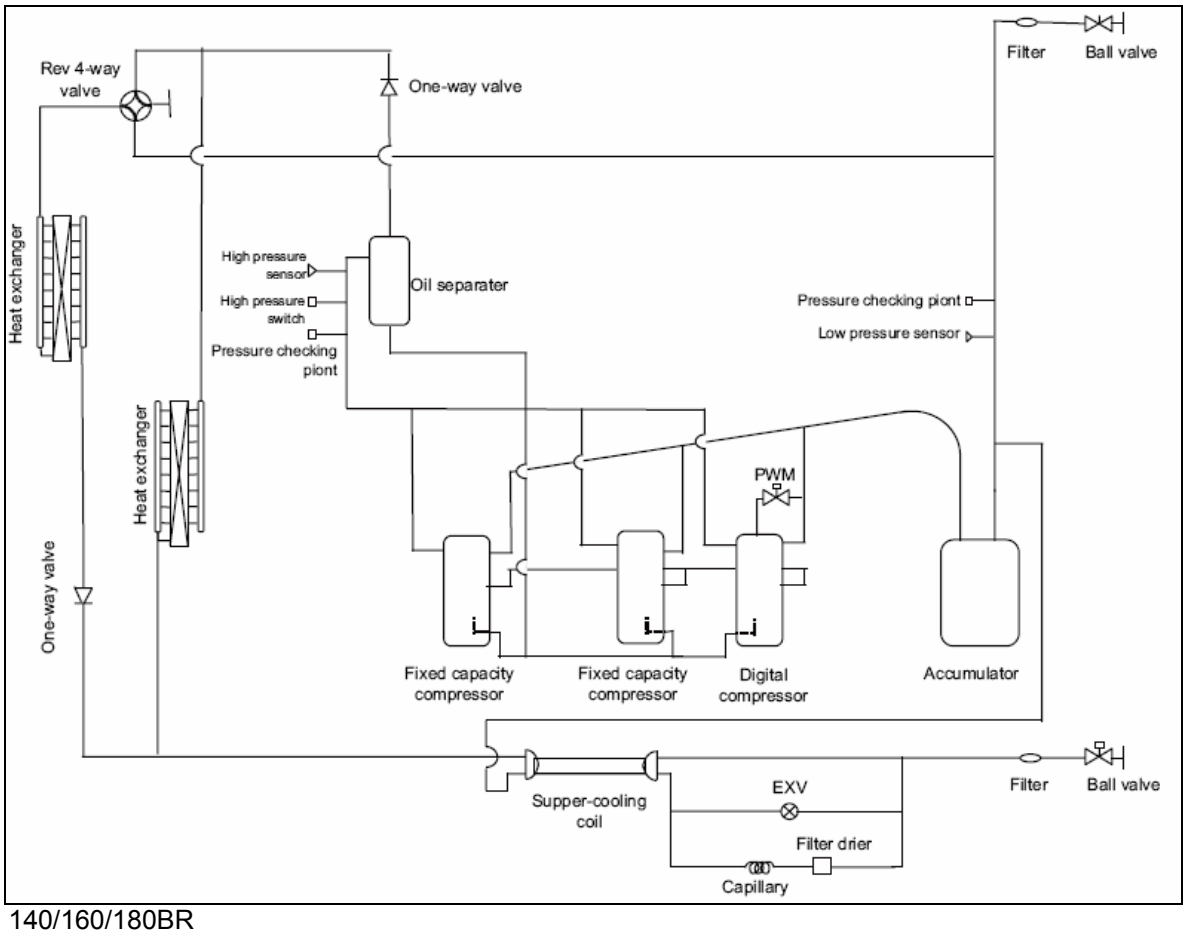
5MDS 80/100/120B



5MDS 80/100/120BR



5MDS 140/160/180B



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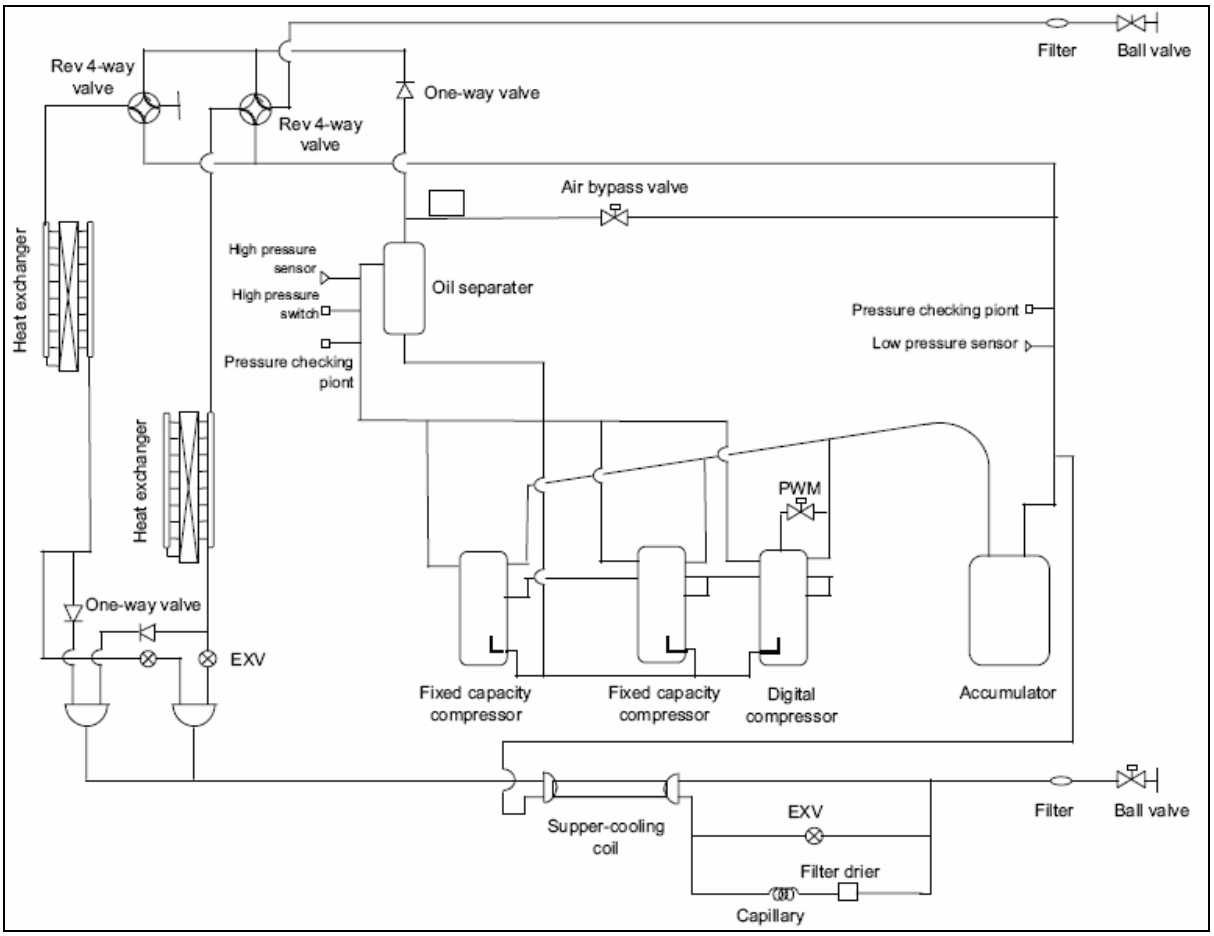

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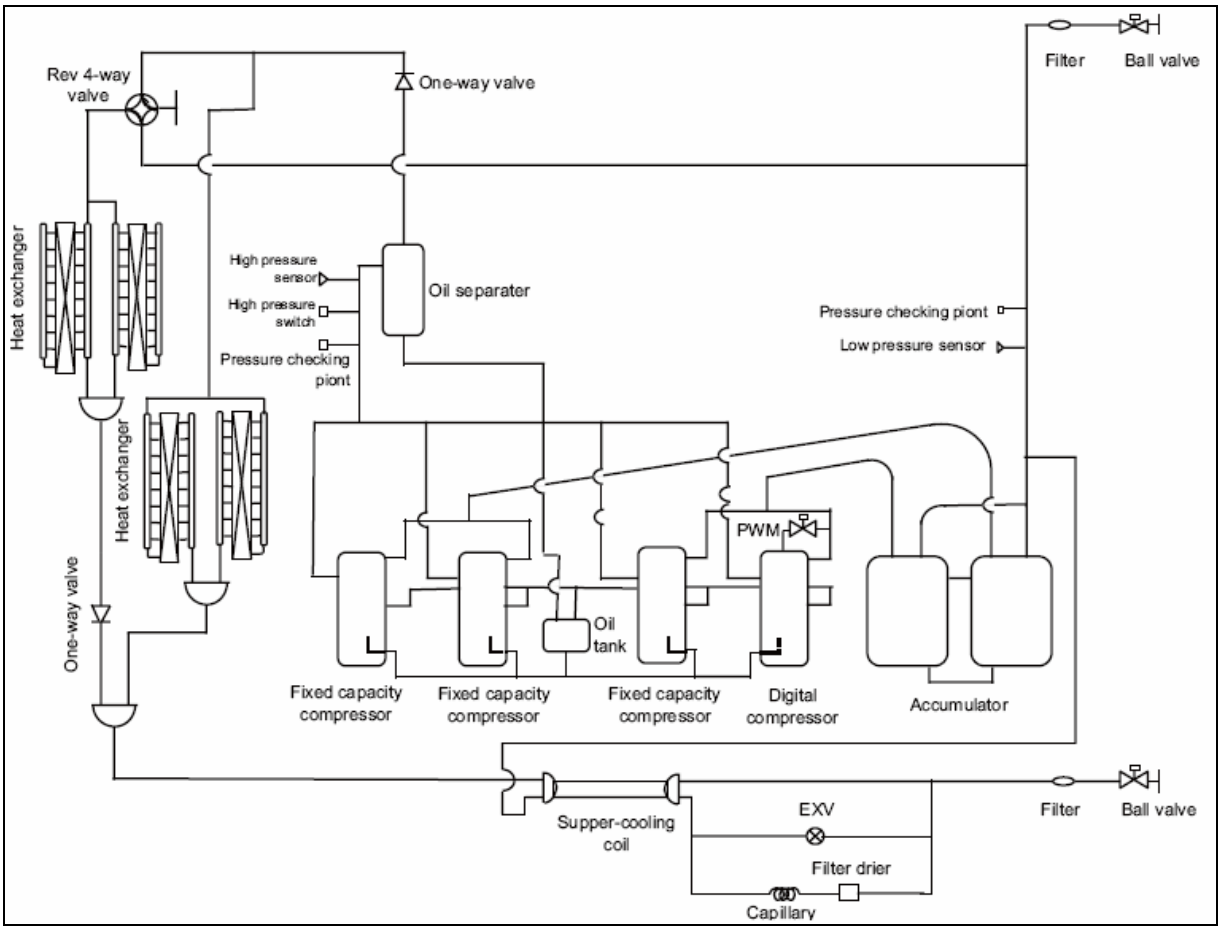
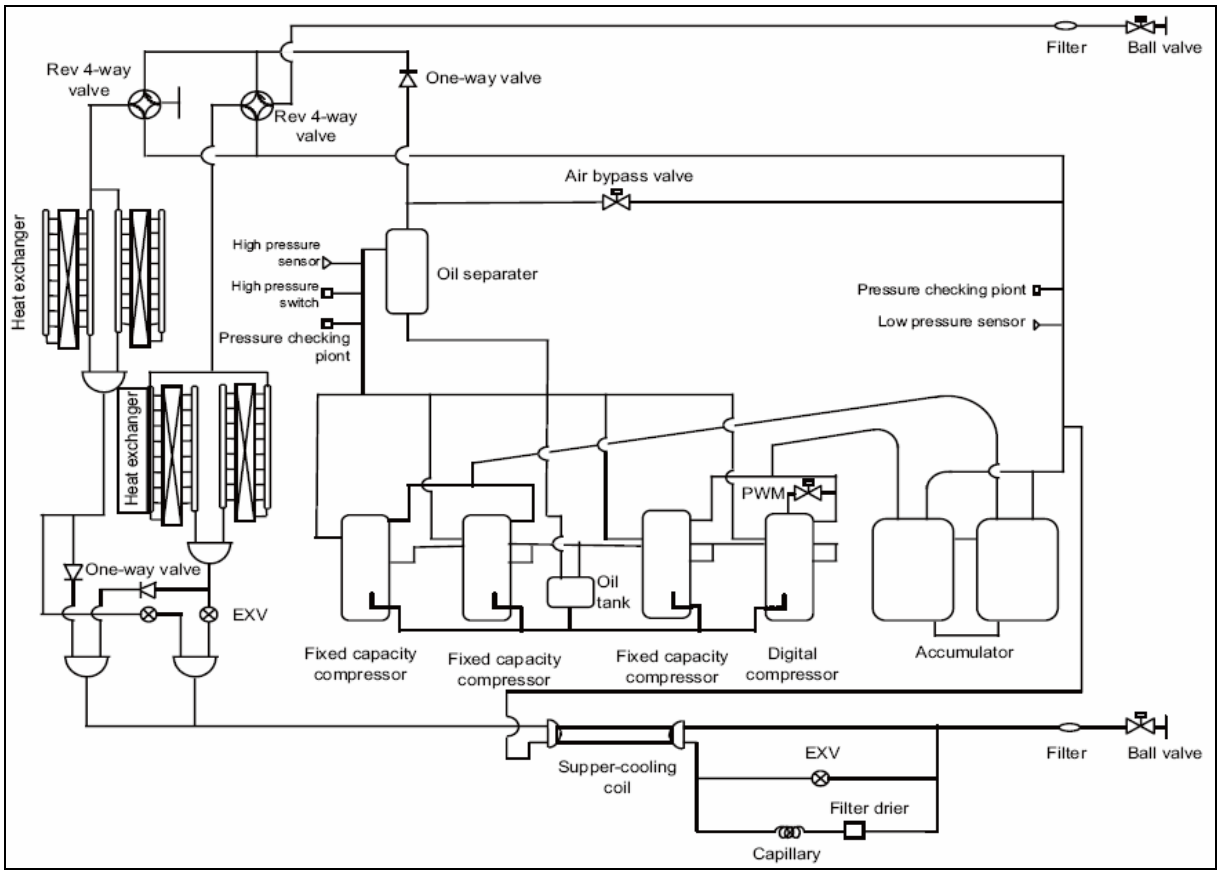
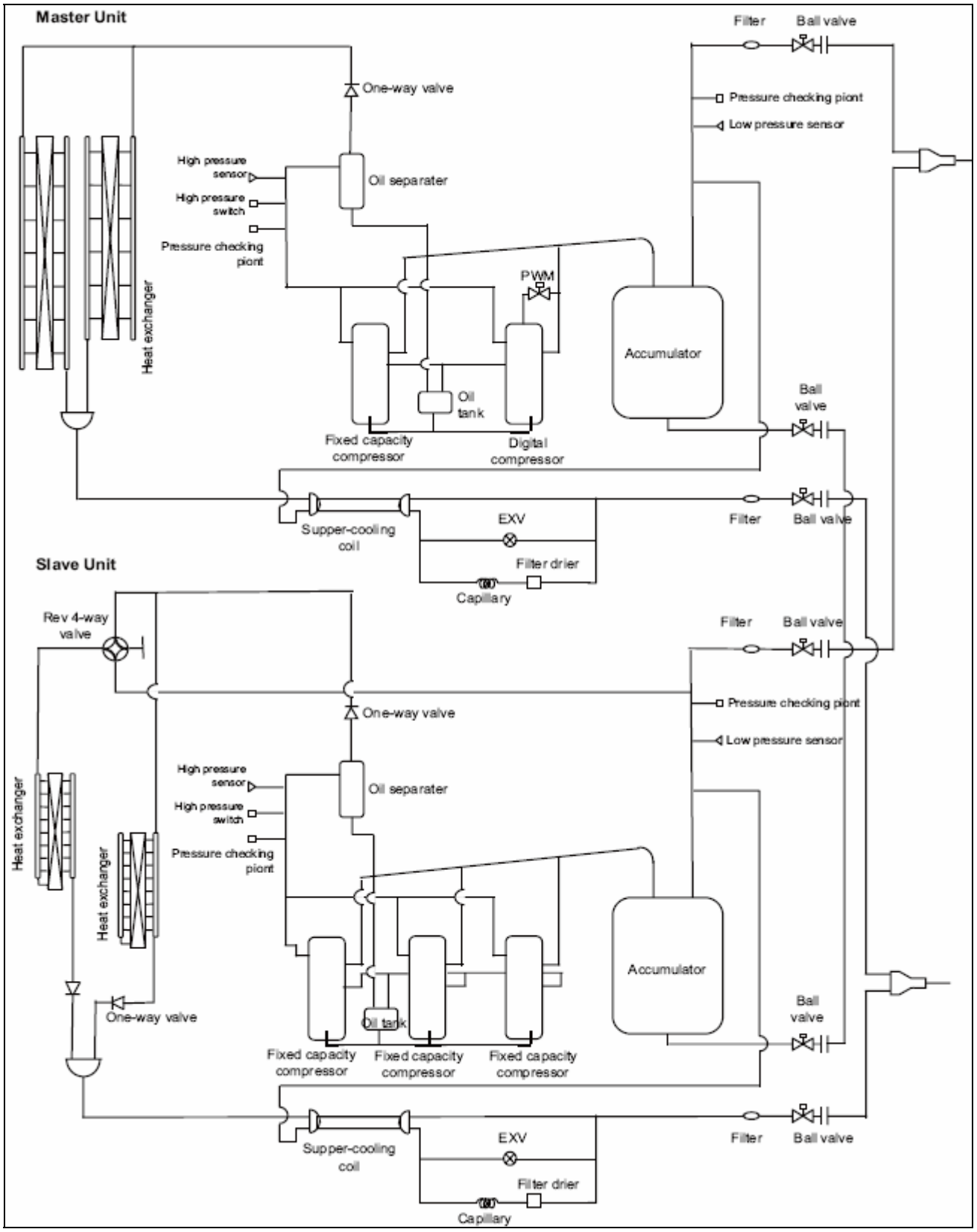
5MDS 200/220/240B



5MDS 200/220/240BR



5MDS 260/280/300B



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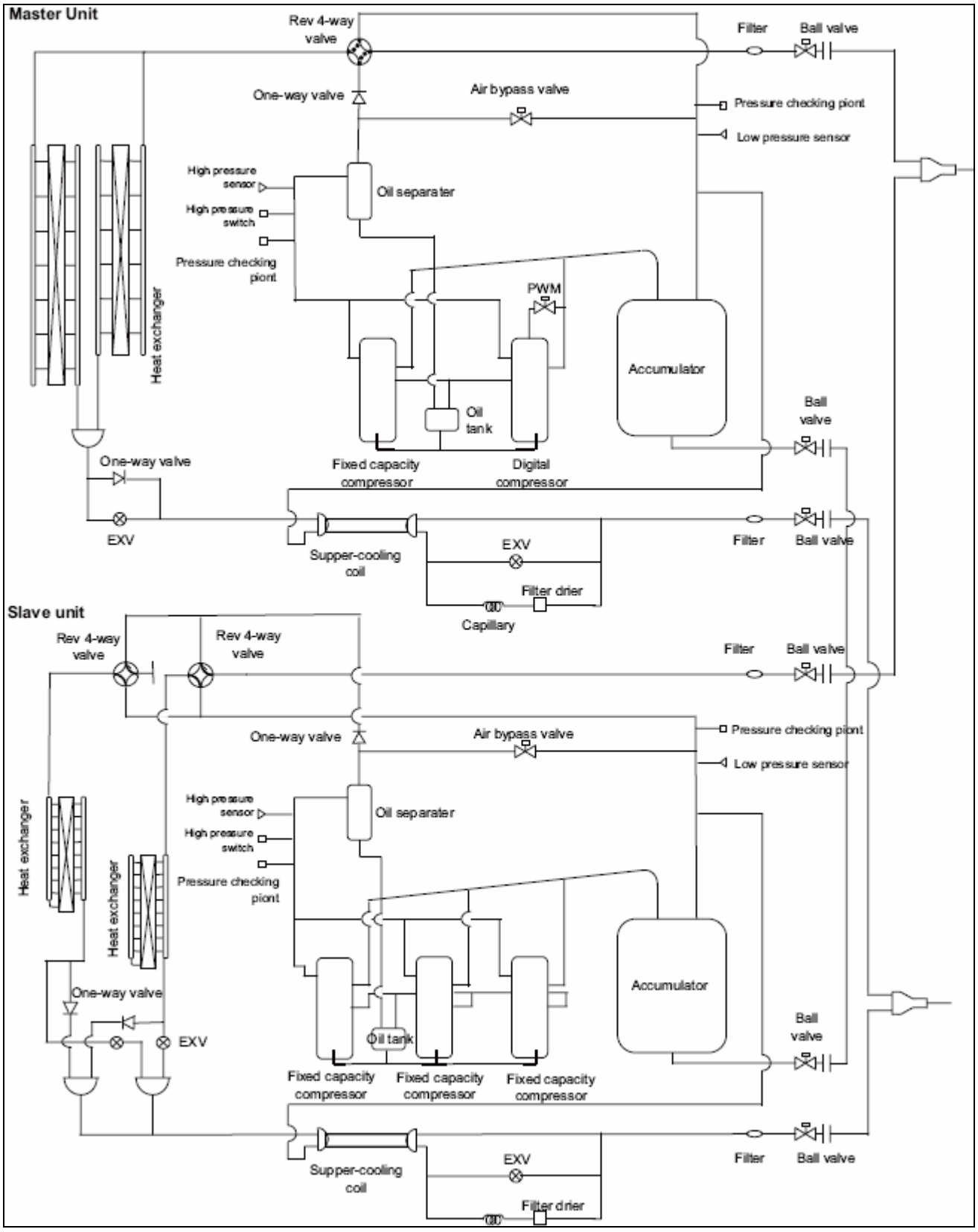
5MDS 260/280/300BR



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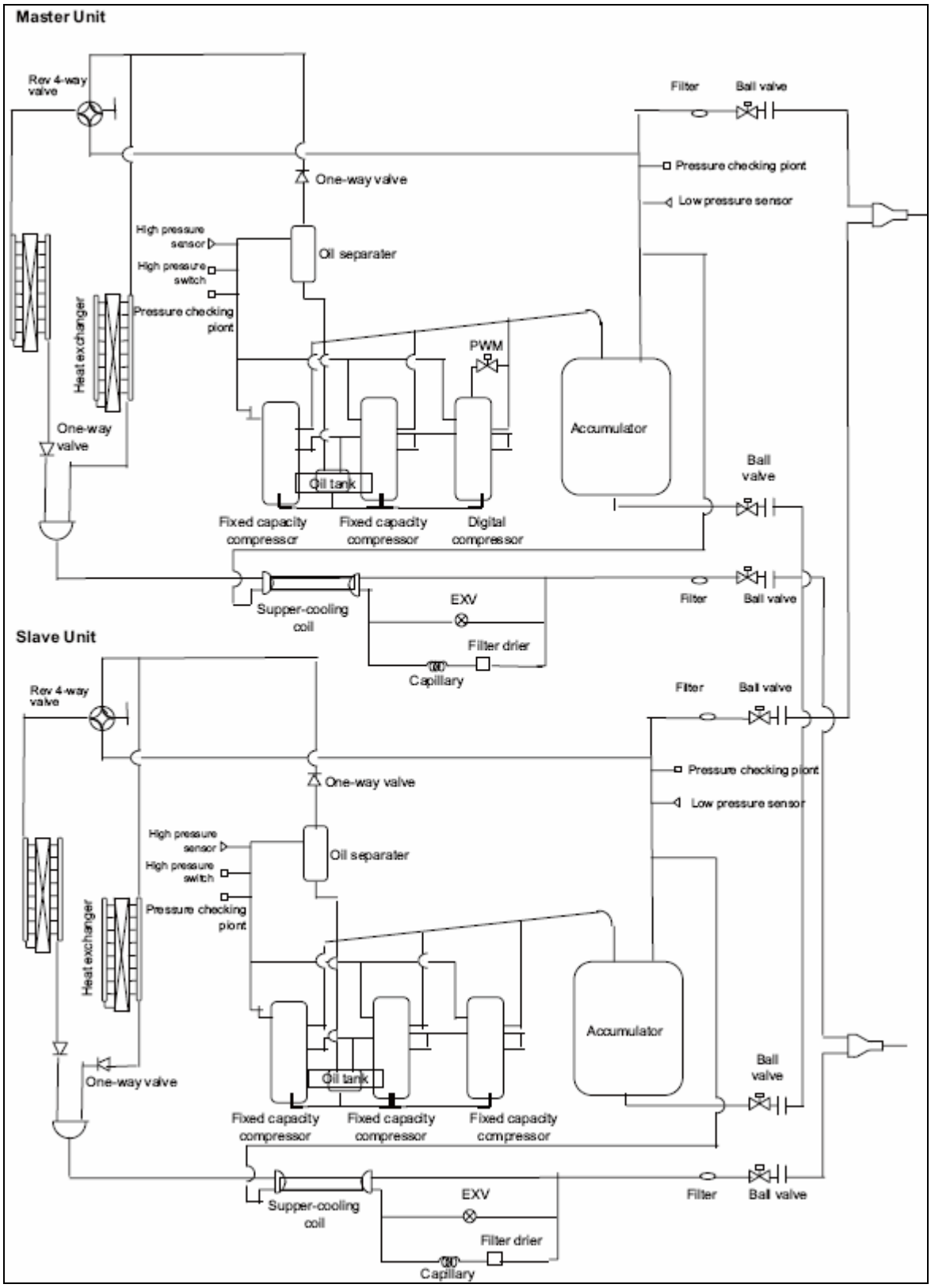
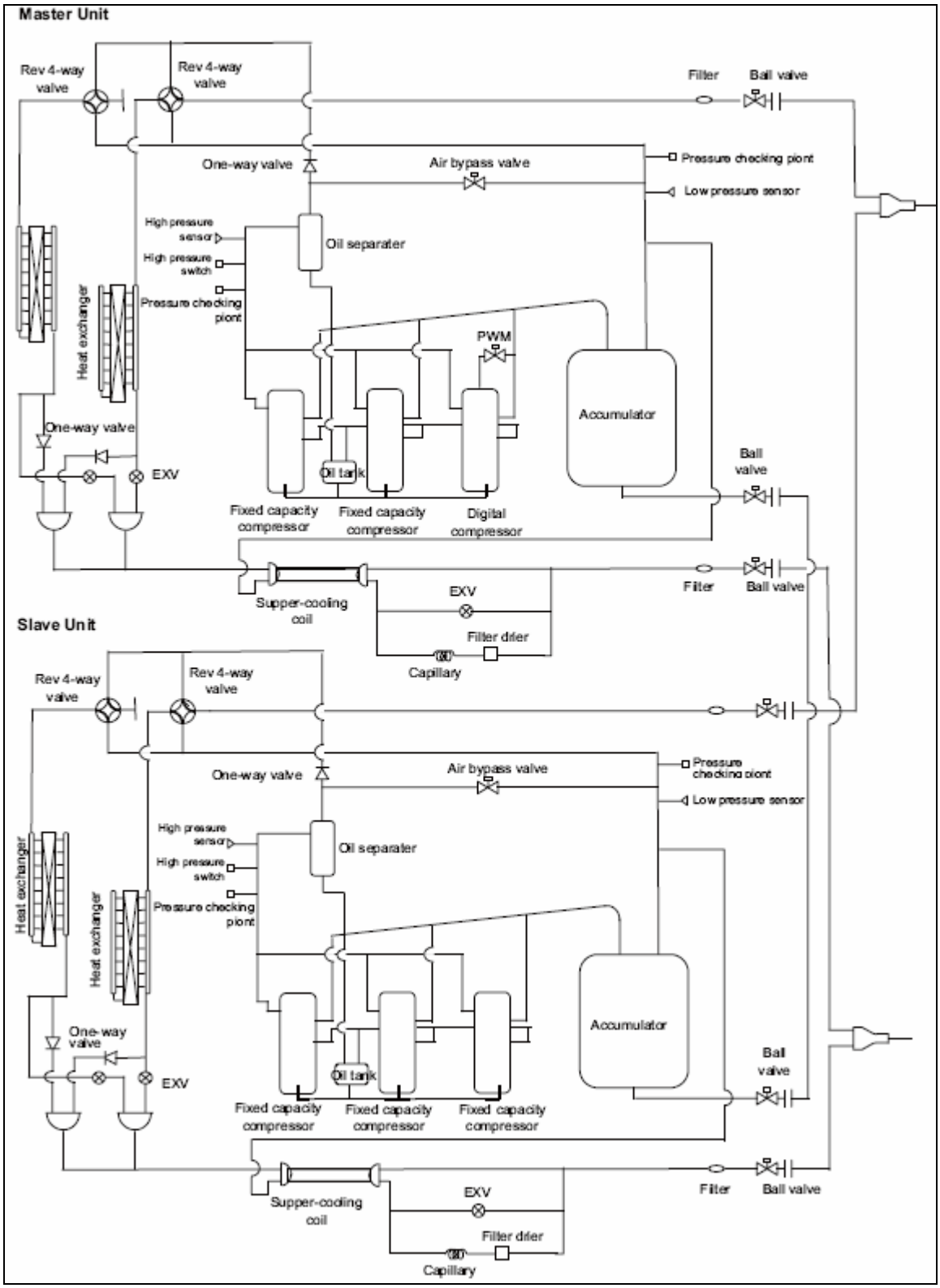
5MDS 320/340/360B



5MDS 320/340/360BR



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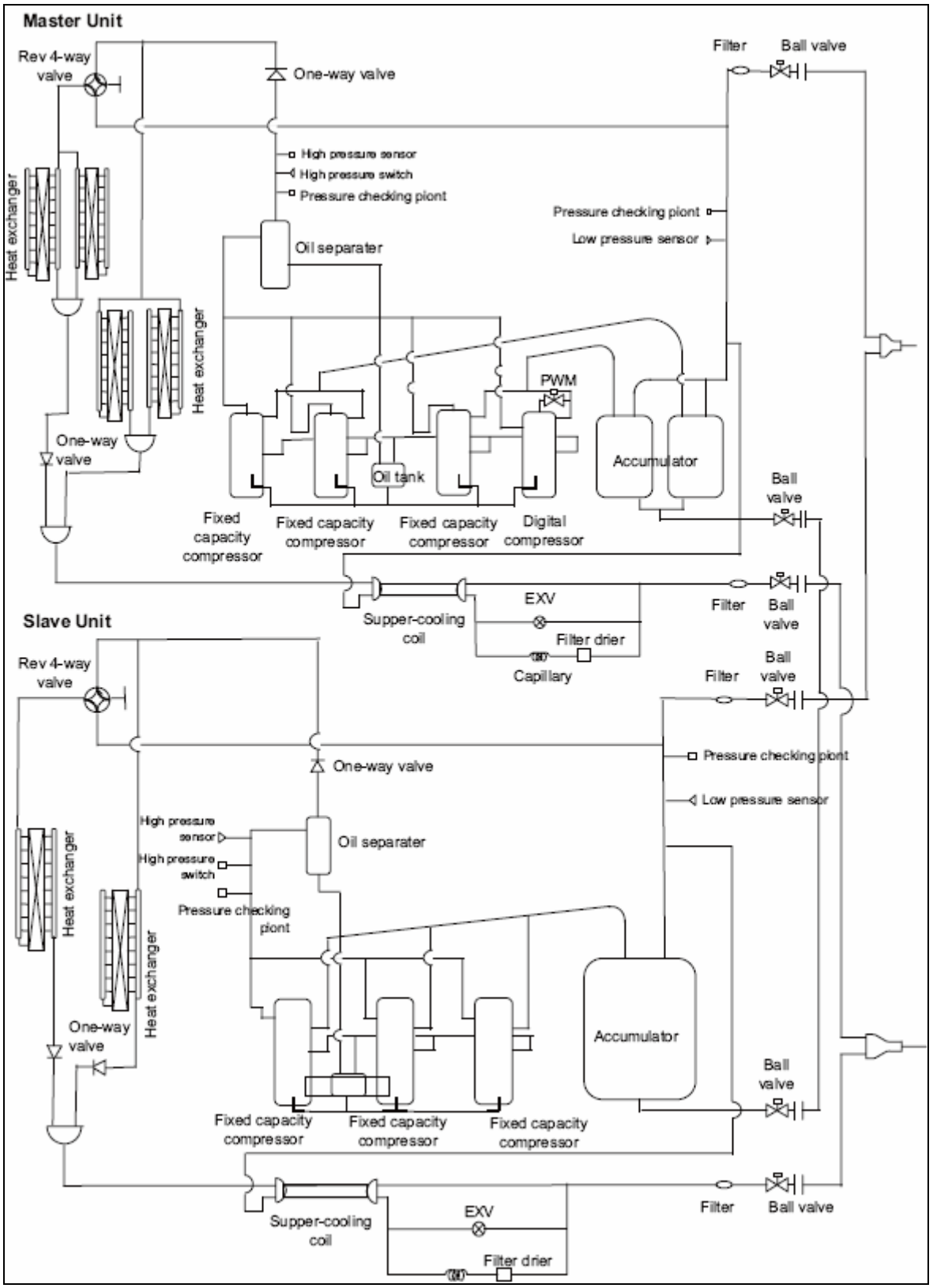

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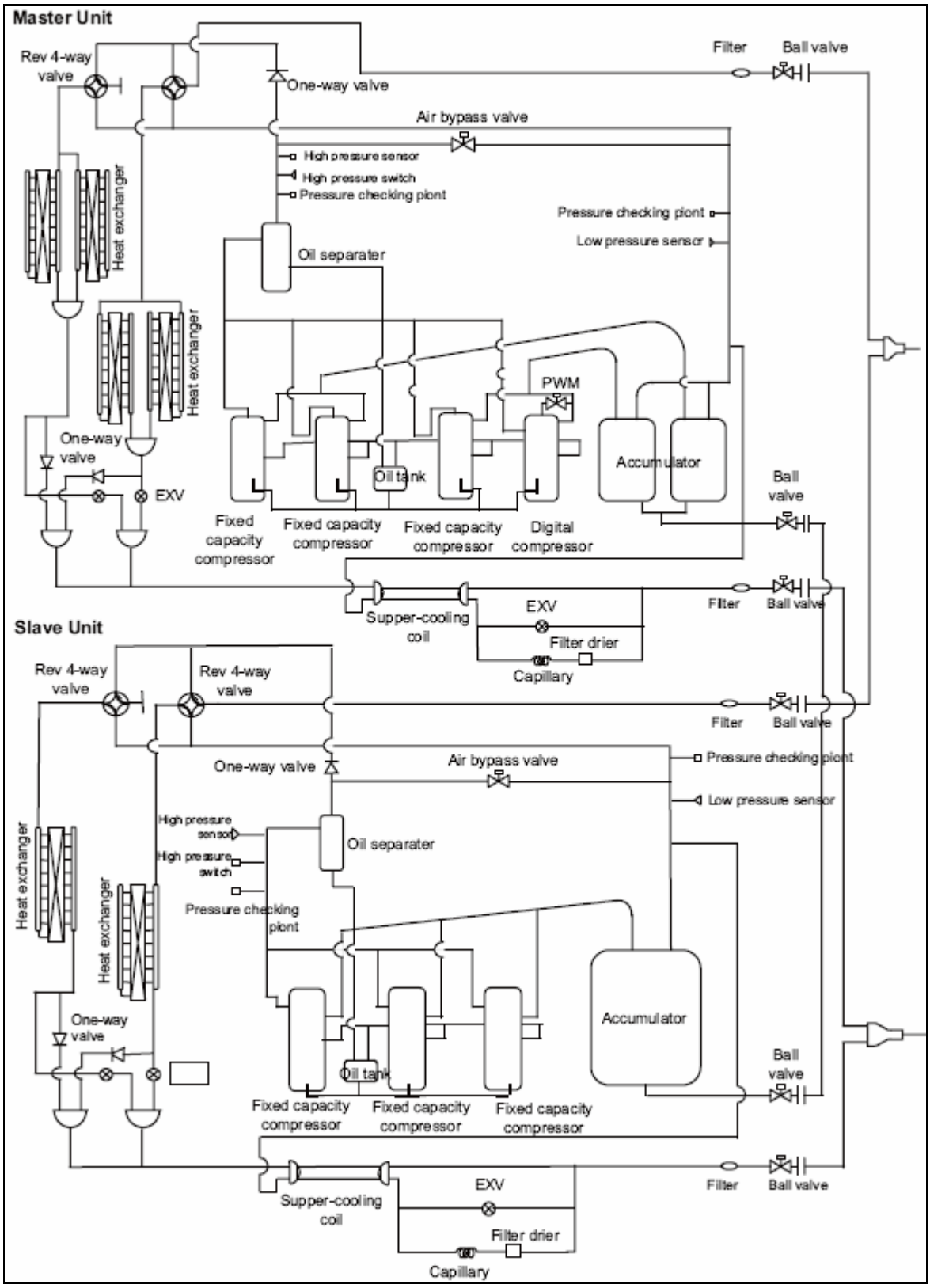

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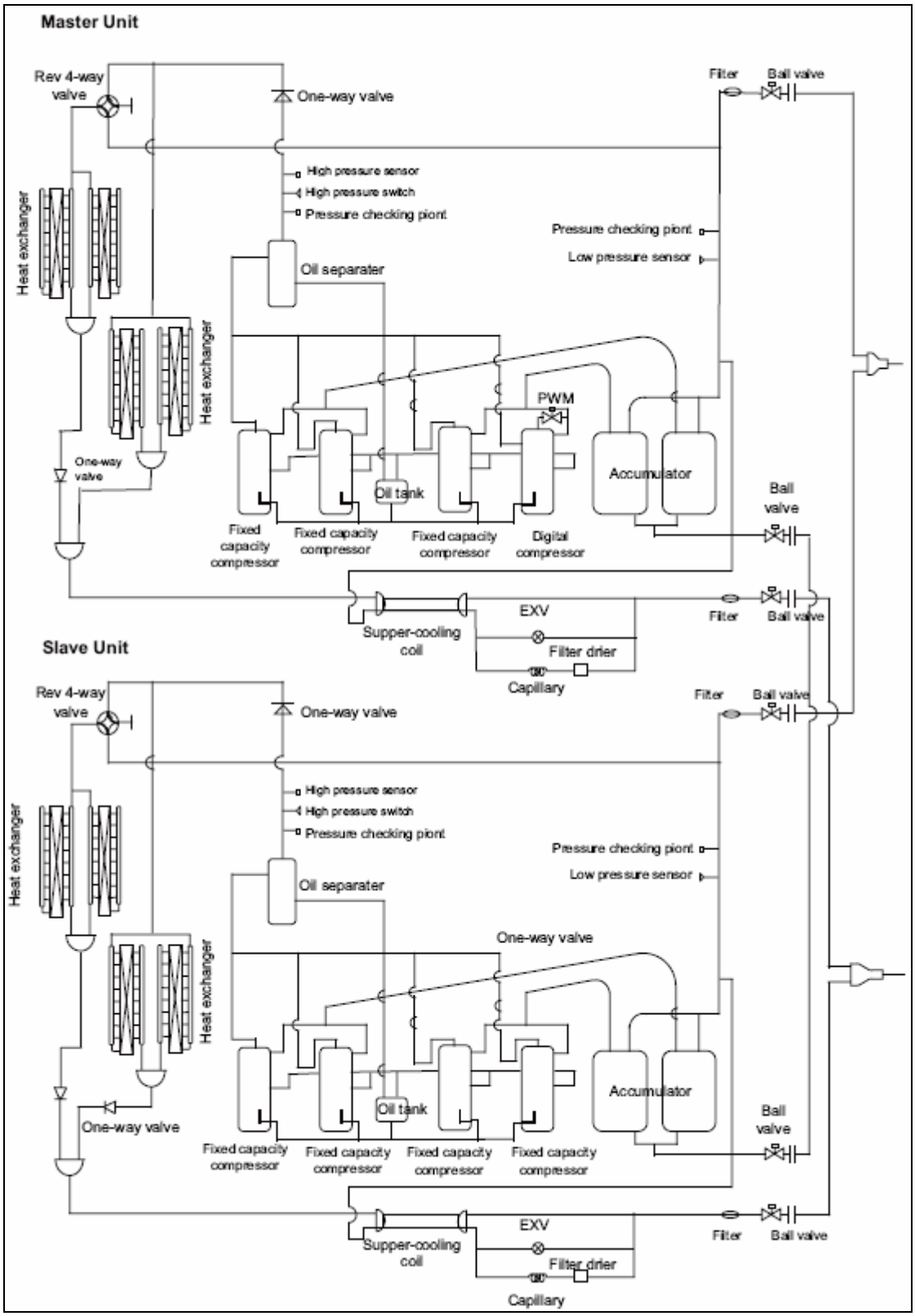

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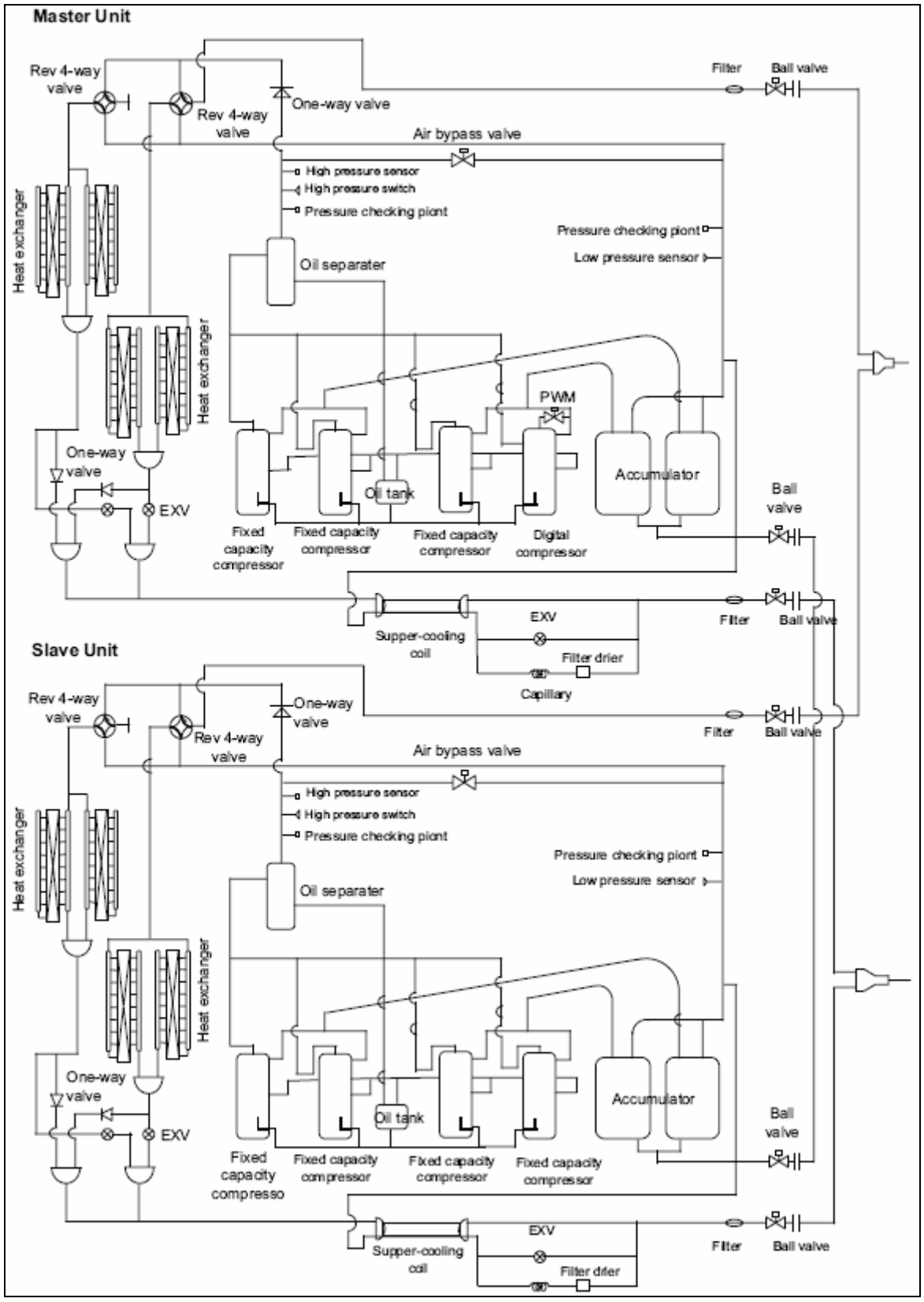

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